THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVI. No. 1420.] LONDON, JULY 29, 1890. [42ND YEAR. Price 6d.

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Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,
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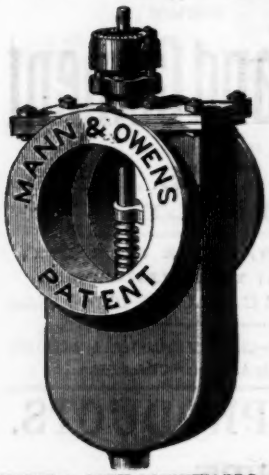
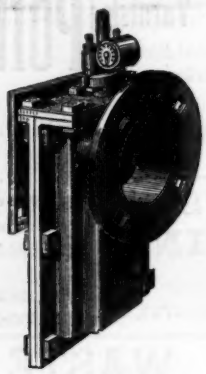
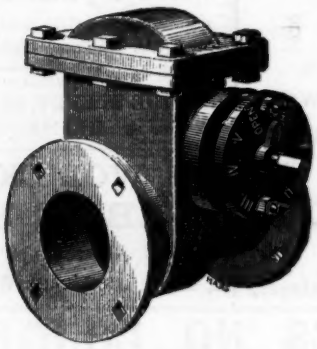


VALVE to OPEN DOWNWARDS.



BRIDGE VALVE for Regulating the Seal of Hydraulic Mains.



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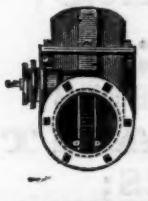

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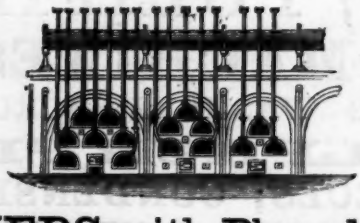

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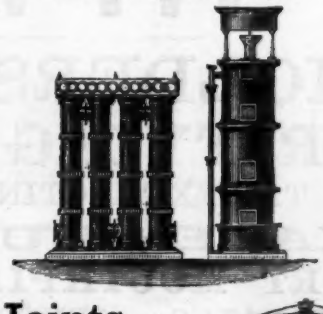

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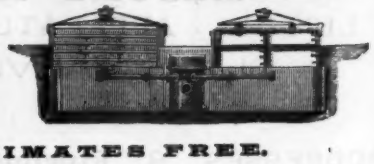

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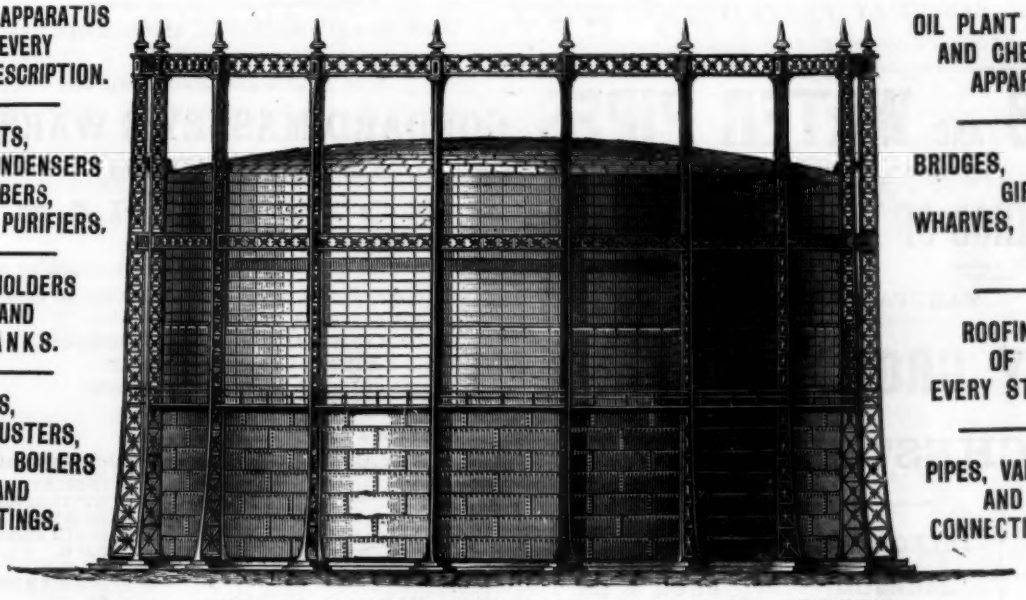

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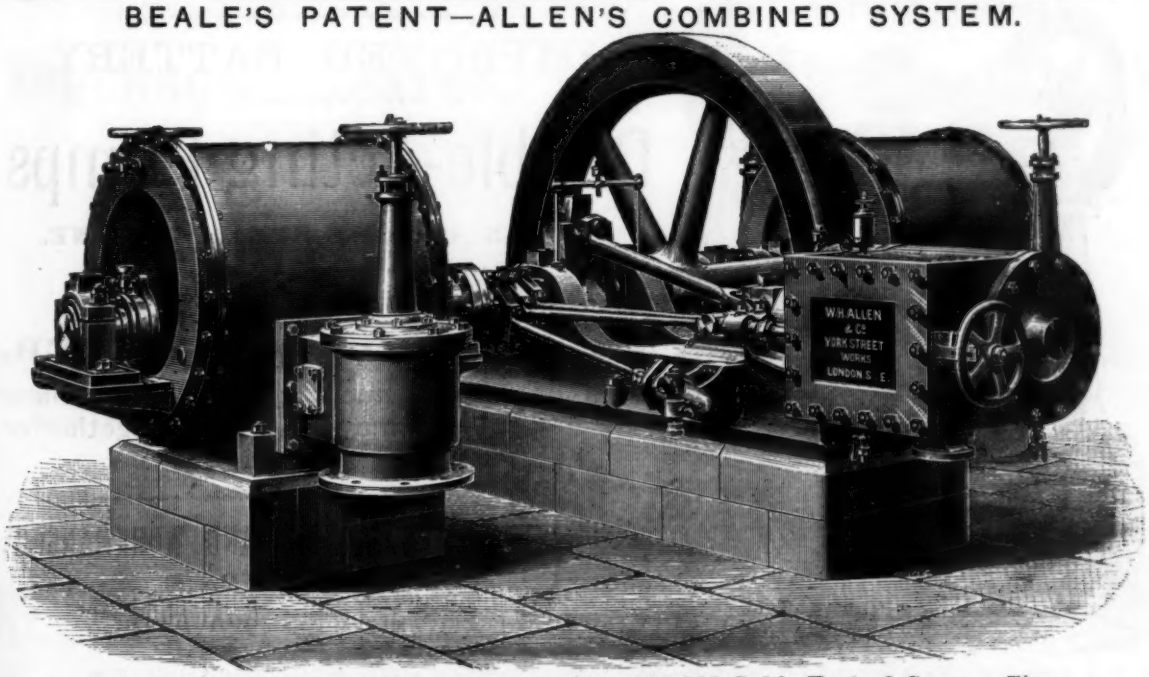

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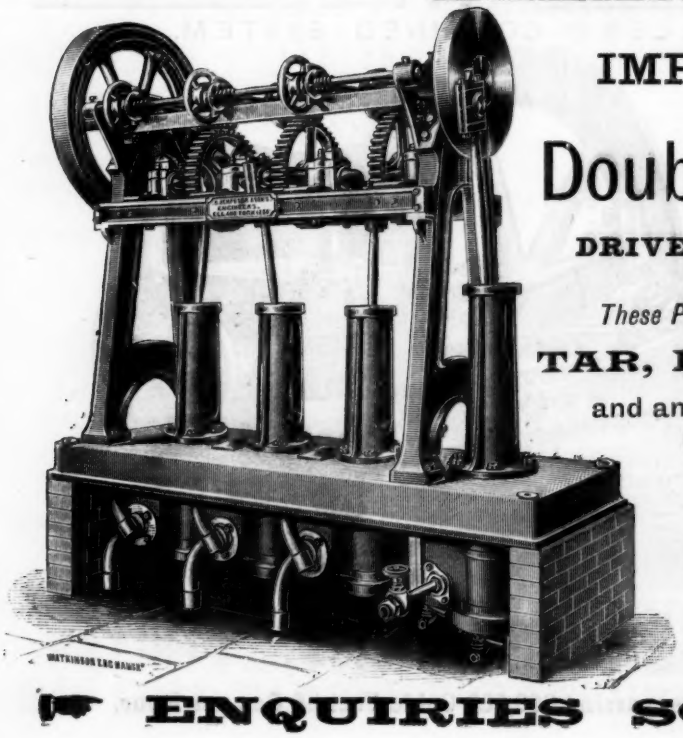

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Double-Acting Pumps

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These Pumps are fitted with Valves for pumping

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EFFICIENCY GUARANTEED.

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REVOLUTION
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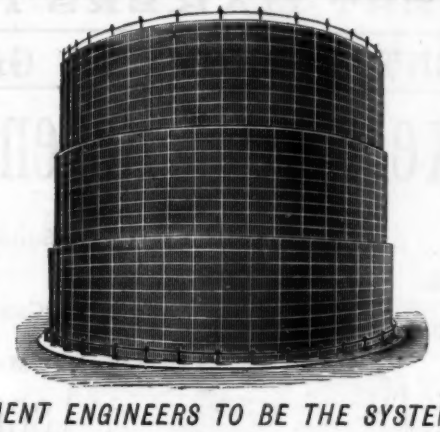
NO COLUMNS. NO FRAMING.
NO PIERS ROUND TANK.
GREATER STABILITY.
TILTING IMPOSSIBLE.

Tank Construction rendered simpler and very much cheaper; the Piers and heavy Base Stones being dispensed with.



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RIVER WATER and SEWAGE EFFLUENT successfully and economically treated in large volumes, by AGITATION WITH METALLIC IRON in

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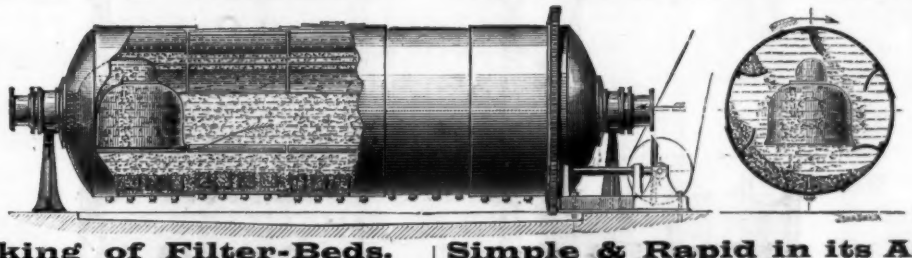

No Choking of Filter-Beds.
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Organic Matter Considerably Reduced.
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Made in Fourteen Sizes, capable of treating singly from **4000** to **1¼** Million Gallons daily.

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The Schülke Regenerative Lamp

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PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

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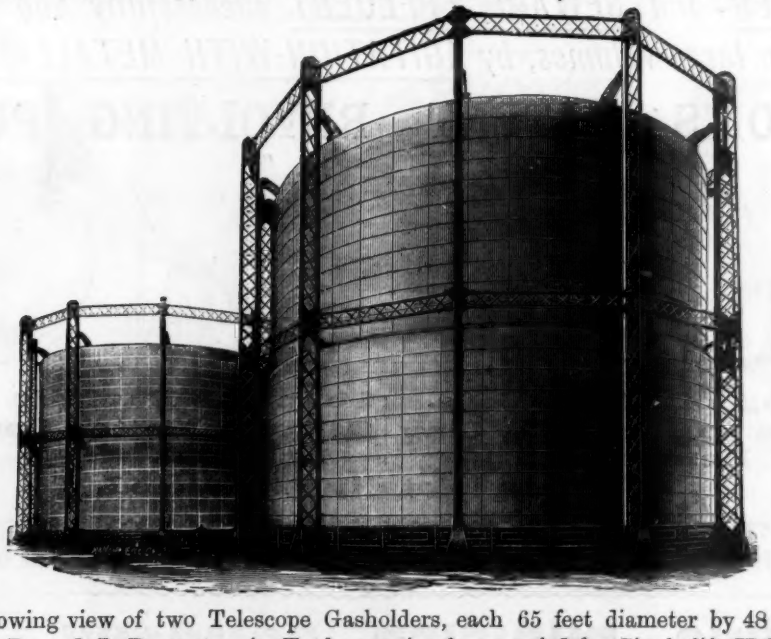

Illustration showing view of two Telescope Gasholders, each 65 feet diameter by 48 feet high, recently erected by Messrs. R. and J. Dempster, in Tanks previously occupied by Single-lift Holders 20 feet deep. The Tanks were made 4 feet deeper, by adding a Tier of Cast-Iron Plates, prepared with suitable Flanges, to meet the Brickwork of a Brick and Puddle Tank. The storeage capacity was thus increased nearly 150 per cent. at comparatively little outlay.

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This Coal yields 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

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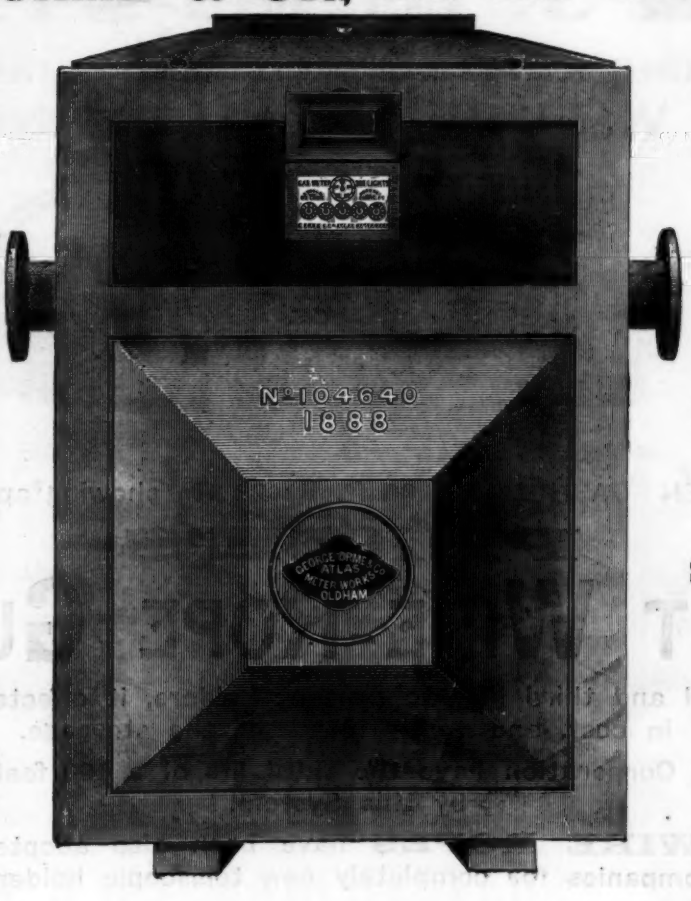
LAMP TORCHES.

GAS, WATER, AND STEAM FITTINGS
of all kinds.



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for Street Lamps.
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Adopted by the Leading Gas Companies and Corporations.

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In adding second and third lifts to present holders, it effects a great saving in cost, and vastly increases the storeage.

The Manchester Corporation have the third lift of a 100 feet holder working by this System.

PEASE'S WIRE ROPES have been also adopted by two other Companies for completely new telescopic holders.

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WITH ROUND CASES.

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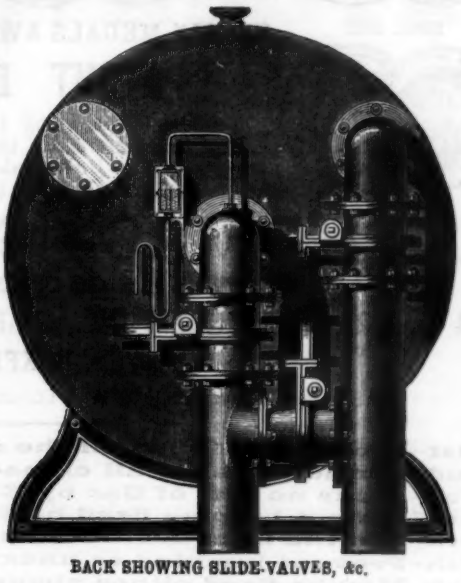
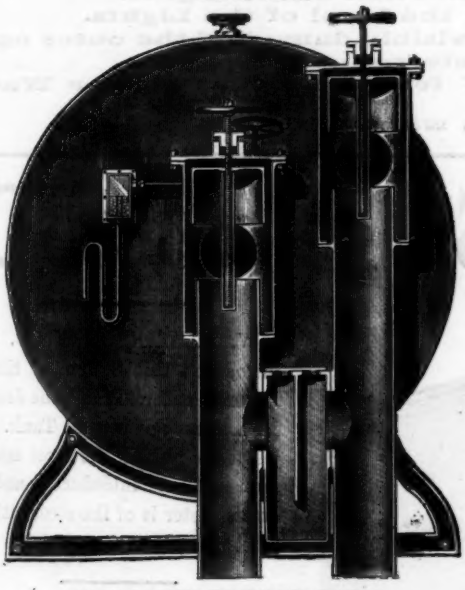
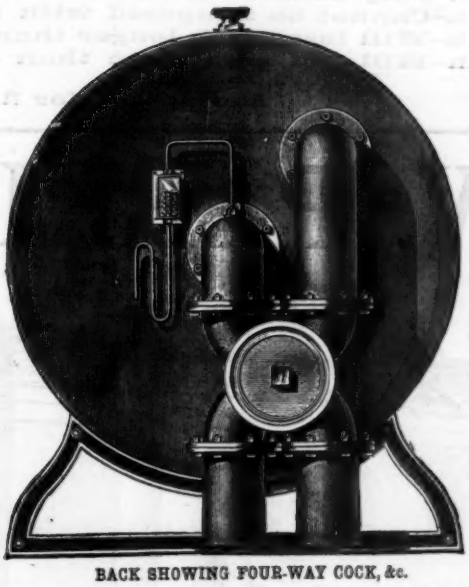


BACK SHOWING SLIDE-VALVES, &c.



BACK SHOWING HYDRAULIC VALVES.



BACK SHOWING FOUR-WAY COCK, &c.

The measuring capacity of a meter depends on the quantity the drum passes in **one revolution,** and not on the quantity the meter may be represented as "capable of passing **per hour.**"

The volume passed at **one revolution** indicates that the drum is of that capacity; but when this test of size is ignored, and only the quantity **per hour** is stated, a delusive standard is set up, which varies with every change in the pressure. Hence, when selecting Station or Large Consumers' Meters, the **capacity per revolution** should be the **only** guide in considering the size of the meter in relation to the price.

WE ALWAYS STATE THE CAPACITY PER REVOLUTION.

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

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1st—Are a remedy for all the defects of Wet Meters.
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6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.

W. PARKINSON & CO.

NEW DESIGN STATION METER.

W. PARKINSON & CO. have introduced this design of Station Meter in order to meet the demand for a more ornamental Tank. All joints are planed, the most modern improvements introduced, and the entire Meter is of the strongest and most substantial description.

FITTED WITH

Parkinson's Patent

THREE-PARTITION

MEASURING DRUM.

HIGHEST AWARD, MELBOURNE EXHIBITION.

MATERIALS and WORKMANSHIP of the VERY BEST QUALITY ONLY. PRICES, &c., ON APPLICATION.

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LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

OFFICE: 10, MAWSON'S CHAMBERS, DEANSGATE,
MANCHESTER.
Telegraphic Address: "PRECISION."

[See also Advt., p. 276.

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NOTICE AS TO PAYMENT OF SUBSCRIPTIONS IN ADVANCE.

Subscribers who desire to avail themselves of the reduction in the Subscription to the JOURNAL by paying in advance for the second half of the Year (10s. 6d.), are reminded that this can only be done during the present month.

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 29, 1890.

The Question of Labour.

IF there is any good in free discussion, the advocates of the Eight Hours Day ought to feel happy just now; for they have had several hearings of late. It is as true as ever that in this country "a man may say the thing he "will," provided only that he chooses the right and proper occasion for so doing. We are not, as a people, remarkable for patience of contradiction in public meetings. Perhaps most of those who really have opinions upon debateable subjects are growing less and less inclined to attend mass meetings for the purpose of having them confirmed by orators of our own way of thinking or questioned by opponents. We prefer to read what speakers for and against us have to say, as reported in the newspapers. The mass meeting is no place for the ventilation of opinions. It is a manufactured article, designed for a certain purpose which to a philosopher is extremely absurd—that is, to persuade a foolish world, prone to judge from appearances, that a certain cause must be just, because so many thousand people can be brought together to applaud it. The utter absurdity of the proposition is evident as soon as it is stated; but, unfortunately, reasonableness and popularity do not always go together. It is not for us to discuss the value of mass meetings in connection with political or religious causes; but with regard to industrial matters, we are open to declare that they have no effect whatever when dissociated from violence and intimidation. Mass meetings are frequently called to "discuss" (as it is facetiously termed) some particular question. Thus at the time of the gas stokers' strike in South London, meeting after meeting was convened "to discuss Mr. Livesey's profit-sharing scheme;" but the discussion was never anything more than denunciation and abuse, poured out into the hungry ears of the multitude by speakers who knew nothing of the subject, but who had a cue to flatter the mob. He would have been a very rash man who at any of these meetings for "discussion" had risen for the purpose of setting the truth before the deluded crowds. Truly, if a man in this free country wishes to speak his mind in a mass meeting, he must first be careful that his auditory are of his own way of thinking.

These reflections arise out of contemplation of the performance of Mr. Cuninghame Graham, M.P., at Norwich, where the Gas Workers' Union lately organized a meeting in the hope of recovering, by the force of "public opinion," the position of command they lost through the firm and dexterous action of the British Gaslight Company. As the managers of the meeting were unable to reinforce their carefully manufactured public opinion by the necessary supplement of paving-stones, brickbats, and the other similar arguments that told so well at Leeds, the result of their enterprise was not equal to their expectations. In times when it was supposed to be every man's duty to mind his own business, it would have been asked what concern Mr. Graham has with the system of administration of the Norwich station of the British Gaslight Company. But it would be idle to put such a question to persons like Mr. Graham, John Burns, and other followers of the immortal Jack Horner, who are ever ready to put their fingers into other people's pies in search of plums for themselves. At any rate, Mr. Graham went to Norwich in order to try and persuade the Gas Company to relinquish their policy of putting all their men under agreements, in the terms published in the JOURNAL; and although he spoke, and wrote to the local papers, he absolutely failed to do anything. His speech and letter are both full of the usual attempts to confuse the issue by representing men who sign agreements such as that adopted by the Gas Company, as poor slaves toiling their lives out for a miserable pittance. Misrepresentation can always be employed when brickbats are not readily available. Mr. Graham does not condemn the use of physical force when it happens to win—as in Leeds, which he named with decided approval. But, after all, he is a very damp squib; and it may be doubted whether, after his Norwich *fiasco*, the wire-pullers of the Gas Workers' Union will try him again. He is simply nowhere as a mob orator beside Thorne, who is at any rate earnest, while Mr. Graham is a manifest trifler. Followers of the Social Democratic idea, as represented in Mr. Graham, are awkwardly situated if they happen to be sincere. They have to be constantly on their guard against the insinuating advances of party politicians, who look on them merely as voters, and will talk Socialism for their own ends just as freely as they will prattle Teetotalism, or any other "ism" that has a few votes hanging to it. Some Socialists seem to be keen enough, however, to see that the party politicians only want to make tools of them. On the other hand, if they follow men like Mr. Graham, who abuses all the party leaders equally, and sees nothing to admire in the political arrangements of either his own or any other country,

they might as well be citizens of the moon as of an English borough, for all the good their voting power will do them.

Only a few days after Mr. Graham's abortive raid upon Norwich, the Eight Hours party had a grand gathering in St. James's Hall, Piccadilly, to hear their apostle, Mr. H. M. Hyndman, discuss the subject with Mr. Bradlaugh, M.P. This fixture smacks somewhat of the style of the Hall of Science, where Mr. Bradlaugh has been for many years accustomed to hold public debate in the same fashion with anybody who cared to argue against him. On this occasion, Mr. Hyndman was to defend the proposition, "That the enactment by law of eight hours a day, or 48 "hours a week, as the maximum amount of work for adults "in all factories, mines, workshops, and businesses con- "ducted for profit, will prove a valuable palliative of our "present industrial anarchy." The wording of this resolution is not unexceptionable, for there is a serious confusion in speaking of the time during which labour is exerted as the amount of work done; but, on the whole, the meaning is sufficiently plain. To the proposal Mr. Bradlaugh moved as an amendment—"That it is desirable that all "wage-earners should work the smallest number of hours per "day consistent with the profitable conduct of the industry "in which they are respectively engaged; that the limita- "tion to eight hours a day as the period during which an "industrial establishment may be carried on, would be "fatal to many large industries in this country; and that "the hours of labour in each industry should be severally "settled by conciliatory conference between the employed "and employers, or their representatives." It is evident that both of these propositions could be argued in many different ways; but neither could be exhausted by any one speaker in a single evening. Hence there could be no conclusive result from such a debate; and the utmost that could be expected from it was that on one side or the other something would be brought out that had not been sufficiently regarded before. On the whole, however, a perusal of the reported debate does not tend to give one a higher opinion of the argumentative powers of the self-appointed champions. Of the two speakers, Mr. Bradlaugh was incomparably the readier and more weighty; but it was easy to confound an antagonist who at the last was driven to declare that he was not an advocate of a hard-and-fast eight-hour day, but of a day's work limited by law to eight hours. Mr. Hyndman's arguments, such as they were, rested on the supposed degeneracy of the race through overwork; on the impotence of workpeople in regard to taking care of themselves; and on the assertion that, under existing conditions, for every stroke the workman makes for himself, he makes three for the capitalist. He condemned Parliament in one breath, and appealed to it for exceptional legislation in the next; and he wound up by exclaiming that, whether or not his arguments were sound, he was championing a great cause—"the emancipation of the working man." He seemed to think that this definition of his object covered everything—false analogy, bad argument, vague speaking, and all that discloses the weakness of a cause.

The arguments advanced by Mr. Bradlaugh are very like those he and others of the same way of thinking have used in the House of Commons and elsewhere. The advocacy of an eight-hour day cannot be based on considerations of health. It would not be equalizing the conditions of labour, but the opposite, to compel everybody to work the same number of hours. Gas stokers and steamship firemen could not stand before the furnaces for eight hours at a stretch; and, on the other hand, where would the workman be if his wife were not willing to work longer than eight hours? Is the cotton operative to work only eight hours a day, and the medical man to be at his beck and call at any hour of the twenty-four? Why should not sauce for the goose be sauce for the gander? For all their talk of enlightenment, it appears to be the Socialists—Freethinkers as many of them claim to be—who practically uphold the doctrine that labour is the chief curse of mankind, to be avoided by all possible means. There is scarcely a Democrat of the gang but would sooner talk his eight hours daily than work. We shall be told, however, that we are dropping into the *argumentum ad hominem*; and so we will stop for the present, with the greater readiness as it appears certain that the eight-hour craze has not gained the slightest force from its recent preachments.

The Meeting of the North British Association.

THE members of the North British Association of Gas Managers met in good force at Perth on Thursday and Friday last, under the presidency of Mr. Samuel Stewart, of Greenock. We give elsewhere an abstract report of the proceedings, as well as the presidential address and a paper by Mr. R. Robertson (the President-Elect) on "Internal "Gas-Fittings;" reserving the publication of the full report till after its revision by the Committee appointed for the purpose at the meeting. The address is characterized throughout—as it should be, in view of the audience to whom it was presented—by its thoroughly Scottish note; and readers in different parts of the world must keep in mind the fact that in most of the President's references to practical points of gas making, it is gas making as done in Scotland—*i.e.*, with the use of non-coking cannel coals yielding gas of high candle power—that he has under consideration. It is only this that explains Mr. Stewart's reference, for example, to the possibility of improving carbonization by the employment of vertical retorts, which would never occur to an engineer accustomed to the strongly swelling coals of Newcastle and the Durham field. The address proved exceedingly interesting; and it included, near its close, an almost unique paragraph, consisting of a statement of the experience of a gas manager who has also done a little business in electric lighting. Mr. Stewart had the supervision of a small public electric lighting plant, laid down by the Greenock Gas Trust, which was worked for two years, and finally abandoned owing to the excessive cost. The story, while not very conclusive from an electrician's standpoint, owing to the fact that the plant was never entirely employed, is full of significance for a gas manager, and not least on account of that very limitation which would prejudice its teaching in the estimation of an electrical partisan; for it shows that, having gone to the trouble and expense of an installation of electric light for the public service, there was found after a while so little demand for the accommodation, that it was given up. The second day of the meeting was devoted to a delightful excursion to Blairgowrie and Craighall, which was as enjoyable as usual.

Natural Gas not an Unmixed Benefit.

CURIOUS reports about the natural gas territories of the United States appear from time to time in the local newspapers. Now and again one sees glowing accounts of the wonderful prosperity of Muncie, or some other town on "the gas belt," which is, of course, traced to the possession of inexhaustible gas wells. Plenty and peace are reported—in the "spread eagle" variety of the great American language—to have taken up their permanent abode in these favoured regions; and the only wonder is that there is anybody left in New York or Chicago. Reading these glowing narratives, one is tempted to wonder whether natural gas is not the *summum bonum* for which the world has waited until now. Before one has time to grow thoroughly discontented with life in any other corner of the earth, however, the chances are that one lights upon other natural gas news that tends to show how even this great gift of Nature is not without its drawbacks. Thus we may read how two years ago natural gas was discovered at Oak Creek, not far from Racine, Wisconsin; the flow being pronounced nexhaustible by self-styled experts who prophesied in accord with the popular desire. Pipe-lines were talked about, and preparations made for the establishment, in the neighbourhood, of some of those great factories which American public opinion seems to regard as most desirable additions to any settlement. The price of land went up to enormous figures in the merry little speculation in "real estate" which followed the outburst of gas from the bowels of the earth; and drill "rigs" broke out like an ugly eruption all over the neighbourhood. Disappointment waited on the projectors, however. The locality failed to develop; and now the whole enterprise is utterly abandoned. At other places where the supply of gas from the wells has proved to be more enduring, troubles are constantly arising between the various conflicting interests affected by the administration of the supply. Some people want to use the gas on the spot; others wish to pipe it away; a third party holds that private consumers ought to be served first and best; while a fourth considers that, if there is any choice, the factory-owners ought to have it. In one place, an odd dispute has arisen over the

action of some church trustees, in allowing (for a consideration) a natural gas company to drill on their ground. The heirs of the original owner of the land, who are in agreement with a rival company, claim that as the site in question was only granted for religious purposes, the trustees have forfeited the grant by their excursion into commercial speculation. They have consequently been ordered to promptly clear away the church and vacate the property. This is a single example of the trouble natural gas sometimes brings after it. One of the first towns to offer free gas as an inducement to factory-owners to settle in their limits was Findlay, Ohio; and now the inhabitants begin to "wish they hadn't." The Findlay people have discovered that although gas may bubble out of the earth, and be had for the collecting, like water, yet money must be spent to gather it in a satisfactory manner, and convey it where it is most needed. In order to give away the gas to factory-owners, somebody must pay the expenses; and the only people from whom the money can be obtained are the private consumers. The ingenious Corporations of the United Kingdom who make the gas consumers pay for the lighting of the streets and for improving the town are outdone by the Findlay authorities, for the latter require the private consumers of gas to find fuel for the factories, which as yet is something beyond Manchester or Birmingham. It is not very surprising, therefore, that the Findlay ratepayers are beginning to think that their system of administering the public gas property needs reforming. One local newspaper has already taken up the cry of "Leave the private consumer "alone." It is certainly high time. Unfortunately, experience gathered in England shows that, when public authorities once get their hands into the pockets of the private gas consumer, they are very loath to take them out again.

Title and Index to Vol. LV.—The title-page and index to Vol. LV. of the JOURNAL (January to June, 1890) are now ready; and, as usual, a copy will be forwarded post free by the Publisher, on receipt of a post card from any subscriber.

Mr. Tim Duxbury, Chief Assistant to Mr. Isaac Carr at Widnes, and brother of Mr. Thos. Duxbury, of Darwen, was last week appointed Manager of the Middleton Corporation Gas-Works.

Railway Rates for Merchandise.—The Board of Trade are now issuing schedules of the maximum rates fixed by the recent Commissioners for the different railway lines of the country. The first two of these deal with the London and North-Western and the Great Western Railway Companies' lines.

Mr. Charles W. Mearns, Manager of the Dromore Gas-Works, has been appointed to a similar position at Downpatrick. He is succeeded at Dromore by Mr. J. Mearns, jun., son of the Manager of the Banbridge Gas-Works, who was himself previously at Dromore.

Presentation to Mr. W. J. Latchford, of Broadstairs.—On the occasion of the annual outing of the employees of the Broadstairs Gas Company, which took place at Dover, on the 16th inst., opportunity was taken to present to the Secretary and Manager (Mr. W. J. Latchford) a testimonial expressive of the respect in which he is held by those under him. It consisted of a massive marble timepiece and an illuminated address; the former bearing a suitable inscription.

The Reported Conviction of the German Continental Gas Association for False Income-Tax Return.—A few weeks ago a report was circulated, on the authority of a Warsaw newspaper, that the German Continental Gas Company had been fined to a large amount for making a false return for income-tax in respect of their Dessau station. We are asked by Herr Oechelhaeuser, the General Manager of the Company, to state that the report was entirely without foundation, and that it was contradicted on the 5th inst. by the Warsaw paper in which it had originally appeared.

Liquid Ammonia for Ice Making.—An advance in the price of liquid ammonia to the extent of 5½cents per pound has lately taken place in America, owing to unexpected large orders for this product for the purpose of making ice. The decrease in the consumption of gas resulting from the brighter weather necessarily entails a lessened production of ammoniacal liquor; and this, of course, causes a scarcity which the advent of hot weather makes more embarrassing to those who are engaged in the ice-making business. There is, however, another reason for the present short supply of ammonia—viz., the falling off in the production owing to the greater extent to which the manufacture of water gas is now carried on in America. Ice makers say that some other source must be found for crude ammonia, as the demand from the producers of artificial ice will considerably increase. It is claimed, however, that with a winter supply of gas they will have little difficulty in meeting the demand, which is quite phenomenal at present.

WATER AND SANITARY AFFAIRS.

A LETTER from Mr. Jabez Hogg appears in another part of our columns, taking exception to some comments which we recently offered on the evidence alleged to have been given by that gentleman before the Corporation Committee presided over by Sir Guyer Hunter. The first question is, What did Mr. Hogg really say when he gave his evidence? He states in his letter: "I have seen only two or three "brief notices of the fifth and seventh days' proceedings, "none of which seem to me in any way to confirm the "accuracy of the quotations you gave in the JOURNAL for "the 8th and 15th inst." Mr. Hogg is perfectly certain that he "never said anything half so silly, and so far from "the truth, as that the River Roding flows into the Lea, "and contaminates the water supply of the New River "Company." We are glad to record this disclaimer; but in our own justification may we quote from *The Times* of the 14th inst., where we read: "Mr. Jabez Hogg, M.R.C.S., said "that since he had last appeared before the Committee he "had made chemical and microscopical examinations of "the water supplied to London. The water supplied from "the Rivers Lea and Roding was worse than he had "stated it to be, because of its contamination." In explanation of how the Roding became connected with the London Water Supply, the *Metropolitan* of July 12, reports Mr. Hogg as saying: "The water which he had mentioned "as taken from the Roding was taken direct into the "Water Companies' reservoirs, and it also flowed into the "River Lea." In the next place we turn to the official report of Mr. Hogg's evidence (a document, by the way, which only reached us last Friday) and still the River Roding is presented to our notice, though in a way so vague and indeterminate that—like a fly in amber—we wonder how it got there. Thus we read: "Q. Does any "of the water from the Roding flow into the River Lea? A. "I think there is no connection between the two rivers. "Q. Because, you know, in that neighbourhood much "market gardening goes on, and the ground is so "highly manured, that it is not in the least surprising "that what is in the water finds its way into the "Roding? A. Quite so; I think that is fair (*sic*) for the "Companies to urge this against my statement; but, "looking at the drainage as one affecting health, it "ought not to go on." We certainly wish there had been something more explicit here; for it might be inferred from such a statement—however incorrectly—that the water of the Roding, with all its impurities, is somehow connected with the supply furnished by "the Companies." The Roding appears to be put on a level with the Lea, as "affecting health," except that it is the worse river of the two. However, we are willing to accept Mr. Hogg's repudiation, when he says in his letter to us: "Neither "did I assert that the highly contaminated water of the "Roding is taken direct into the reservoirs of the Water "Companies.'" We had reason to suppose, as we have already shown, that Mr. Hogg did say so; but we must conclude that on the points at issue he was misreported. We can but regret that Mr. Hogg failed to observe the misstatements and at once to correct them, so as to disabuse the public mind of the errors promulgated in his name.

Private Bills and the Autumn Session.—A question has arisen as to the position of Private Bills, in view of the meeting of Parliament in November. As is well known, these Bills must be deposited in the Private Bill Office in November, to enable them to be proceeded with on the meeting of Parliament. The authorities of the House (who have been appealed to on the matter) have expressed the opinion that, while the rule as to depositing must be adhered to, the measures cannot be taken until after the re-assembling of Parliament in January.

North of Ireland Association of Gas Managers.—The annual meeting of this Association will take place in the Assembly Rooms, Newry, on Tuesday, the 12th prox., under the presidency of Mr. Andrew Gibb, Engineer and Manager of the Newry Corporation Gas-Works. According to the programme of arrangements issued by the Honorary Secretary (Mr. James Whimster, of Armagh), in addition to the President's address, there will be two papers—one on "Retort-Settings," by Mr. M. Martin, of Drogheda (illustrated by a model); the other on "Furnaces," by Mr. W. B. Featherstone, of Dundalk—and the Committee will present a report on the proposed change in the constitution of the Association, to which reference was made in the JOURNAL for the 8th inst. After the meeting, the members will dine together in the Imperial Hotel; and, if practicable, there will be a drive to Rostrevor in the evening.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 264.)

THINGS are perhaps a shade better on the Stock Exchange, so far as a more hopeful feeling goes; but confidence will need a good deal more restoration before business upon anything like a fair scale is resumed. So the rule appears to be to keep quiet, and wait to see what is going to happen; and to anticipate the holiday season meanwhile. In the Gas Market there has been no stagnation, except so far as regards prices; for very slight retrogressions are the only change. Gaslight "A" fell 1 on Monday; and subsequently a fair amount of business was done in it without further change. But prices were rather widely divergent—ranging from highest to lowest. Having nearly exhausted their floating balance (which formed working capital), the Company are going to raise further capital by the issue of 6 per cent. preference stock—part of the authorized capital of the London Gaslight Company, now amalgamated. If this, or some of it, be not converted into debenture stock, it will, we presume, be known as preference "K"—a denomination which was intended for the South Metropolitan stock seven years ago, in the abortive scheme for the amalgamation of that Company. South Metropolitan stock have been very quiet, and not so firm. "C" has changed hands at easy figures; and "A" is offered on lower terms. Commercials are quite a blank. In Suburbans and Provincials, hardly a transaction has been marked, and quotations stand still. The Brentford Company announce dividends for the past half year at the old rates; but it would appear that, in order to pay them, they will have to trench upon their floating balance to the extent of upwards of £7300. This is a considerable inroad; for, although the balance which will remain after payment of the dividends will be equal to 5 per cent. upon the paid-up capital, it forms their only reserve fund. Of the Foreign undertakings, Monte Video shows a slight reduction, owing to the wretched state of affairs in Uruguay. All others remain steady and without any feature. In Water, business has been very moderate; and prices were at their best. But still they were good enough to keep the last quotation unchanged.

The daily operations were: Business in Gas on Monday was quiet, and prices generally were very fair. Gaslight "A" was quoted 1 lower, though the only transaction marked was as good as 247. Buyers of "H" were also 1 lower. South Metropolitan "A" fell 2½. On Tuesday, business was almost confined to Gaslight "A," which kept up well. Monte Video receded ½. A transaction was marked (the first, we believe) in the newly-quoted West Ham Company; the £5 shares fetching 10¾. This is equivalent to 215 for 10 per cent. stock, and gives a return of 4⅝ per cent. for the money. On Wednesday, the tendency was to lower prices; but quotations did not move. The same may be said of Thursday generally; though Bombays were exempt from any tendency to weakness. South American descriptions were flat. Business was quite limited on Friday; and prices were moderate. Gaslight preferences kept up. On Saturday, there was some movement in Gaslight "A," and signs are not wanting of something like a coming struggle over the price. What few other stocks were touched were not at their best.

ELECTRIC LIGHTING MEMORANDA.

Electricians Distrusted by Parliament—The Board of Trade Abused by Electricians—The Ferranti System in France.

THE rejection by the House of Lords of the Central London Railway Bill has furnished the newspapers with food for much curious comment. Politics are so muddled up now-a-days, that one never knows what to expect from the writers in the Daily Press. Still, it was with something of a shock that one read in the *Standard* a querulous and perfectly futile complaint against the exercise by the Lords Committee of their undoubted right to reject the Bill without any regard to the fact of its having proved acceptable to the Commons. It is this kind of silliness that makes a newspayer reader weary of what is ostentatiously proffered as "public opinion." It may or may not be right that the promoters of every Private Bill should be required to prove their case twice over—giving the opposition the advantage of discovering their weak points in a first hearing; but the practice remains a general one, and must be altered, if at all, on general grounds, and not because the Second Chamber thinks fit to exercise a public duty in a manner obnoxious to partisans. In this case, which was a project for making a subway at great depth below Holborn, for the purpose of improving communication between the City and the West-end, it was an integral feature of the scheme that electrical traction should be employed for the trains. The Commons Committee were so diffident with regard to the practicability of the scheme, that they inserted a provise in the Bill prohibiting any active steps being taken to carry it into effect until the lapse of a certain period after the opening and successful working of the prototype subway between the City and Kennington. All that the Lords did was to stifle a Bill to which the Commons had only permitted existence under conditions of strictly suspended animation; and it is open to be argued which was the kinder course. The point of real interest in this matter is the fact, admitted by many who were not unfriendly to the Bill, that the promoters could not adduce any convincing evidence in support of their contention that electrical traction could be successfully applied in the way they had in view. They were rich in estimates and promises, of course; but the Lords practically told the electricians called in support of this part of the Bill that they must first prove their case by experiment on a less ambitious scale. Consequently, the rejection of the Bill is more of a reverse to the electricians than to anybody else. It is not difficult to foresee what would have happened in the event of the electricians failing, not for the first time, to justify their professions. The subway once made, Parliament would be appealed to in order that some other means of traction than electricity might be sanctioned; and then what was to have been a clean, sweet subway would perforce be converted into a filthy, evil-smelling railway tunnel.

The electrical journals are fain once more to revile the Government for the slow progress of the electric lighting industry in British towns. We thought it would not be long before they fell back upon their old familiar scapegoat. What the bankrupt companies of 1882 would have done without the Act to put between themselves and their irritated shareholders, nobody can imagine. It was a perfect shield for directors who had paid extravagant prices for worthless patents, and saw one by one their magnificent promises turn into wonderfully close imitations of "false pretences." When the Act was amended, we were bidden to watch the revival of electric lighting. But time goes on, and the new order of directors of electrical companies are as far from dividends as their predecessors. Consequently, the word has gone round: "No trade—abuse the Government;" and the chorus has begun. Unlike its usual independent habitude, the *Electrical Review* has joined in the strain; publishing a grumbling article designed to prove that "the efforts of the Government to control electric lighting manifest the same blunders as in previous attempts at industrial regulation." The accusation is rather vague; but its object is clear enough. Electric lighting does not get on in a business sense; and somebody must be blamed for it. It is complained that "the Board of Trade officials lack practical experience of the industry they endeavour to control;" but may not as much be said of the electricians who are desperately essaying to make a living out of the same industry? If perfect knowledge is not to be found in the Railway Department of the Board of Trade, shall we find it at Deptford, Chelmsford, Barnet, Brighton, or anywhere else? If Major Cardew is an inefficient guide, is Mr. Robert Hammond or Mr. Massingham to be preferred?

A central lighting station on the Ferranti system was recently inaugurated at Troyes. This system is being exploited in France by the Compagnie Nationale d'Electricité; and Mr. S. Z. de Ferranti went over specially to be present at the opening ceremony, which was, however, marred by the death of one of the Company's servants, who was killed by a shock from a transformer which he grasped to save himself from falling down a cellar. Itwasrather an ill-omened start; but the Company are reported to have carried out all the prefectoral regulations, and accordingly, by the law of France, are blameless. The idea of shifting blame in this way from those who ought to know what they are about to a Government official whose acquaintance with the risks of central station working must be imperfect, is calculated to make one pause and ask whether this is one of the things which are supposed to be done so much better in France. It appears from the newspaper account that the way of intending users of the electric light is not to be made easier in Troyes than it is elsewhere. Subscribers have to enter into five years' agreements; paying a minimum rental equal to 29s. per lamp per annum. Meter-rents vary from 1s. 3d, to 4s. 10d. per month, according to size; and the charge for 10-candle lamps is after the rate of ¾d. per hour, with about ⅝d. for the nominal 16-candle lamps. At these rates the local gas company, though charging as high for the commodity as is usual in French provincial towns, need not fear that the electricians will ruin them. As we have often had occasion to remark, the flourishes which attend the opening of electric lighting establishments are generally in strong contrast with the dulness of their subsequent career; and there is never any publication of accounts to show how the promises of their founders are fulfilled.

A CARBURETTER FOR GAS IN BULK.

IN the issue of the JOURNAL for May 28 last year (p. 989), there appeared an account of the Maxim gas carburetter, as applied to the works of the Maxim-Nordenfeldt Arms and Ammunition Company, Erith. This report showed that, under conditions then stated, it is of advantage for large consumers of gas to carburet it with petroleum spirit, at current prices, now that Mr. Maxim's inventive genius, assisted by Mr. Frank Clark's ingenuity and experience, has put at their command an apparatus which may be regarded as practically perfect for the purpose. It seems rather late in the day to discuss the benefits of carburetting gas, seeing that the advantage of the principle has been so widely exemplified in practice by the success of the albo-carbon lamps. The question has always turned upon two points—first, the economical advantage; second, the suitability of the apparatus. The albo-carbon system has been successful

because it has satisfied both points; but, of course, this system has its limitations. As demonstrated at Erith, the Maxim system comes in where the albo-carbon system leaves off; rendering the economy and other benefits of carburetted gas lighting available over an extended field not previously occupied by any similar device. It must have occurred to many professional readers of this first description of the Maxim system of carburetting, that if it was good for so much as was claimed for it, and established on the authority of Mr. Corbet Woodall's investigation, it ought to be good for more. This is precisely what the proprietors of the system have recognized, and have been working for a year and more to prove by experiments on an extended scale. In the course of an article that recently appeared in the JOURNAL, passing reference was made to these experiments, which were designed to settle the mechanical conditions under which petroleum spirit—benzoline, gasoline, or whatever it may be called in commerce—could be used in gas-works for improving the illuminating power of the bulk of gas sent out for public consumption. It is with the satisfaction that any friend of gas-lighting would feel in the contemplation of a valuable addition to the resources of the industry, that we now chronicle the successful completion of this new and important development of the Maxim system. Its advantages have been recognized by the Engineers of The Gaslight and Coke and South Metropolitan Companies; and in all probability it will come into immediate and extensive use in connection with the gas supply of both sides of the Thames. The benefit of the system having been fully demonstrated, the first complete apparatus for dealing with the bulk of an output of 1½ million cubic feet of gas per hour has recently been erected at the Bromley station of The Gaslight and Coke Company, under the supervision of Mr. W. B. Wright, the Engineer of the works. Here the plant comprises a store-tank for 1000 gallons of spirit, a gas-fired boiler, a volatilizer, and a spirit-vapour injector, with the necessary pipe connections to the gas-main. The apparatus can, of course, be put in connection with the gas-mains at any point; at Bromley it is on a pipe which can be used indifferently either as the inlet or outlet of the holder. The gas boiler is required here merely because Bromley is a station of "magnificent distances;" and it would be impracticable to bring steam to the spot required from the works' boilers half a mile off. In most works, a separate boiler would hardly be necessary; but this is a detail. The essential parts of the plant are the volatilizer and the vapour injector, which stand close together on a ground space about 4 feet by 5 feet. The necessary plant is therefore not heavy, cumbrous, lumbering, or expensive; and the idea that these small vessels, with the adjacent tank, are competent to supplant heaps of cannel, to say nothing of the retorts for carbonizing it, appears at first sight almost preposterous. Yet it is undeniable fact, as Mr. Clark soon shows the most sceptical inquirer.

Here it may be as well to admit, to prevent misunderstanding, that the speciality of the Maxim carburetting system is purely and wholly in its mechanical dispositions. Anybody can carburet gas with petroleum spirit, which is not rendered more or less fit for the purpose by anything in the Maxim system. The question whether it pays to use this material for such a purpose is altogether independent of the Maxim apparatus, and rests, of course, on the price of the carburetting material, the possibility of making the gas carry it, and the value of the additional illuminating power which its presence in the gas confers. As to this, it has been proved that gasoline, which is merely petroleum spirit of about ·650 specific gravity, or benzoline, which may run up to ·700 specific gravity—either costing about 1s. per gallon delivered in London—will, if introduced in a proper manner, raise the illuminating power of ordinary 16-candle coal gas by one candle for every pint per 1000 cubic feet. These are rough figures drawn from actual working, and are not based on exact laboratory experiments. But perhaps they are all the more instructive on this account. Thus it appears that for something like 1½d. per 1000 cubic feet, the illuminating power of the whole bulk can be raised one candle even at present prices for spirit, which are for small orders. It would be cheaper if purchased by the truckload. The price for carburetting may appear high; but gas managers do not need reminding that it is always the last candle that costs most. If the cost of common coal gas in the holder is divided by the gross illuminating power, the price per candle will appear low; but can an additional candle or two be obtained for the same average cost? It is well known that the cost of higher candle power increases with great rapidity; so that it would cost considerably more than twice the average price per candle to put on another candle, or candle and a half, upon the quality of the ordinary gas made in London; while to increase the illuminating power by 30 per cent., or (say) from 16 to 21 candles, would make the whole product double as costly to manufacture. In carburetting, on the contrary, any additional illuminating power can be obtained for a mere arithmetical increase of expenditure. In practical gas making, the chief worry and trouble arise in connection with the last candle. In London, for the sake of example, where 16-candle gas must be sold under severe penalties, the quality of the output, as tested at the works, must never fall below 17 candles, and is more often higher. Only those who are responsible for keeping up the gas to the required minimum in the district know what this absolutely necessary margin of safety costs in money and trouble. The slightest mishap in the works upsets the balance. A poor lot of coal, such as most gas-works had to put up with last winter, or a disappointment in the quality of the cannel, will drive the manager to his wits' end; to say nothing of incidental troubles with purifiers, condensers, exhausters, stale gas in the holders, and what not. It can be done in the ordinary way, so long as things keep fairly straight, and, as a matter of fact, it is done day by day in all the London gas-works. It would be idle to deny, however, that a means whereby the whole bulk of the output may be immediately improved by night or by day, say from one to two candles, must be an immense relief to the gas manager; and this is what the Maxim apparatus professes to effect.

If it is conceded, therefore, that this object is desirable, and that the cost at which the extra candle or two may be had from gasoline is reasonable, the Maxim system claims to render the process of carburetting effective, simple, safe, and cheap. So well designed is it, that the watcher at the jet photometer in the governor-room can set it in action instantly by turning a cock whenever the indications of the instrument require it. This will be understood from the arrangement of the volatilizer and its connections. This vessel is a wrought-iron cylinder 3 feet in diameter, and 4 feet high, containing lower and upper horizontal division-plates which are connected by tubes. The gasoline is introduced to the bottom division, and rises a certain height in the tubes. Steam is admitted outside the tubes, heating them, and consequently vapourizing the gasoline. The gasoline vapour leaves the vessel at the top, and flows to a large injector, which occupies the position of a bye-pass on the gas-main. It is now evident that if this injector is opened, a certain measure of gasoline vapour will rush through it, mixing with, and carrying forward the surrounding of coal gas, which eventually finds its way into the main, where it mixes with the bulk. Thus only a portion of the entire quantity of gas actually passes through the injector, but that which does so pass is carburetted up to 35-candle power, and carries this increased value until it re-enters the main, and participates with the bulk, which it does very readily.

Thus, to all intents and purposes, the Maxim carburetting apparatus is a steam-jet exhauster, with the volatilizer substituted for the steam-boiler, and a jet of hydrocarbon vapour replacing the steam in the injector. The apparatus is made self-regulating in a variety of ways, which may be best indicated by stating that *nothing wrong can happen to it*. All that is necessary to start the process is to turn on the steam. The steam pressure opens a diaphragm-controlled valve, which admits gasoline to the bottom of the volatilizer. The levels of the tank and the vessel in question are such that the latter cannot overflow. Then the attendant opens the injector, and the gas flows through. If only a little vapour is being taken off, so that the pressure rises in the volatilizer, the only result is to drive the fluid back into the store-tank, and consequently lower it in the vertical tubes. The lower the spirit stands in these tubes, which are surrounded by steam, the less there is of it exposed to the volatilizing heat. On the other hand, a quick draught from the jet promotes the flow of spirit into the tubes; and the higher the liquid stands in these, the more it vaporizes. Again, the injector is also self-regulating, so that the more vapour is turned on, the more gas flows; the result being that, whether much or little gas passes through the injector, it all comes out carburetted to the same standard of 35 candles. This standard might, of course, be raised or lowered by modifying the proportions of the injector; but Mr. Clark finds it the best in practice, because it is not too rich to carry perfectly for the short distance between the injector and the return connection with the main, and is yet rich enough to ensure the greatest results from the comparatively small bulk of gas actually passed through the injector.

It only remains to be stated that observations on the trunk main of The Gaslight and Coke Company from Bow to Holloway have proved that the addition of one or two candle power —which, be it understood, is all that the Company require of the system—holds good throughout any length of the distributing-mains available for a durability test. The extent to which a gas company will find the system available depends, of course, upon the requirements of the individual case. It may be used as a corrective for preventing the accidental lowering of the illuminating power of gas, or as a complete substitute for cannel in regular working. Not the least of its benefits is that it effectually prevents the deposition of napthalene in the district mains and services, even clearing away deposits already formed, as recently appeared in the case of a specially troublesome main in South London.

We cannot close this notice of the Maxim system of carburetting gas in bulk without acknowledging the ingenuity manifested in the apparatus, and the care with which it has been adapted to the conditions of practical gas manufacture by Mr. Clark—himself an experienced gas maker.

Presentation to Mr. R. W. Edwards.—Last Thursday, the members of the Gas and Water Committee of the Corporation of London presented to Mr. R. W. Edwards, the Chairman of the Committee, a silver tray and a tea and coffee service, in recognition of the admirable way in which he had conducted the business of the Committee, whose functions will cease at the close of the current municipal year.

NOTES.

Tests of Boilers.

Mr. Bryan Donkin, jun., and Professor Kennedy, F.R.S., have undertaken what should prove a valuable series of experiments intended to compare the performance of various boilers using the same description of fuel. The authors remark that, in nearly all the boiler trials hitherto made, different kinds of coal have been burnt; and thus a useful economic comparison of one boiler with another has been rendered difficult. For these trials the opposite course was followed, and a stock of about 100 tons of Nixon's Steam Navigation coal was laid in to commence with; the object being to test different kinds of boilers with this coal, which was carefully mixed to insure as much uniformity as possible. Details of the manner of making the tests are published in *Engineering*. The coal is a kind that burns freely, with little or no smoke, cakes slightly, and leaves little ash and clinker. Calorimetrical valuation of the coal by M. Scheurer-Kestner gave it a value of 15,640 units per pound pure and dry. By chemical analysis the thermal value appeared to be 15,560 units. The theoretical evaporative duty of the coal was 16·1 lbs. of water per pound. The first experiment of the series was made on an old vertical boiler used as a reserve at Messrs. Donkin and Co.'s works in Bermondsey. The boiler is not put forward as a good example of the kind; the results being chiefly valuable for comparison. The test lasted 8½ hours, and 1597·5 lbs. of coal were used. The supply of air to the furnace was not sufficient; and consequently a rather high proportion of carbonic oxide (2·70 per cent.) appeared in the chimney gases. As a net result, 9·57 lbs. of water were evaporated per pound of coal, from and at 212° Fahr. The proportion of heat absorbed in heating evaporating water was 63·8 per cent., while 12·7 per cent. was lost by imperfect combustion.

Sinking Excavations in Quicksand.

An interesting experience in excavating in a bed of quicksand was recently related to the New England Water-Works Association by Mr. Albert F. Noyes, City Engineer of West Newton, Massachusetts. Mr. Noyes had occasion to make an excavation about 15 feet deep in quicksand, near some buildings, and a settlement of the buildings was feared if the work was conducted in the ordinary way. The excavation was in the form of a trench 60 feet long and 8 feet wide. Usually there are strata of coarse material underlying these quicksands, which convey the ground water in a horizontal direction; but if the sand is tapped, the water will rise up through it and make it run, the ground water having the least resistance in the vertical direction. If the water can be drained out, or its level lowered below the bottom of the trench, this fine sand becomes compact, and excavations can be made in it in perfect safety, with the use of only light sheeting. In the case in point, in order to effect this drainage, fourteen 1½-inch pipes were driven equidistant about the excavation to be made; all the pipes having the ordinary tube-well points, and being fitted outside with a fine mesh wire strainer. They were driven down to a stratum of coarse material lying from 35 to 50 feet below the surface. All the pipes were connected together and attached to a common plunger pump, which enabled the water to be drawn down to a level below the intended depth of the excavation from its normal depth of 3 feet. When it was found by test tubes that the pump had mastered the water to the required depth, the excavation was made, and the sides stood very solid. All the material employed was saved for further use; so that, in the end, the work was done much more cheaply than if a single sump-hole had been sunk in the usual way, with the additional advantage that the neighbouring buildings were not disturbed in the slightest degree.

An Observation of Phosphorescence.

The study of the causes of phosphorescence is complicated by a curious discovery made by Mr. Ernest Fahrig and reported in the *Chemical Trade Journal*. He narrates that, being in a dark room, having in his hand a sealed bottle partly full of a solution of ozone in water, he idly shook it up; whereupon a soft phosphorescent glow of light floated above the surface of the water and pervaded the space in the upper part of the bottle. The appearance was only momentary; but on shaking up the liquid again immediately afterwards, the light reappeared, although in much diminished intensity. Further repetitions of the shaking failed to produce any results; but after an interval of ten days, the liquid had apparently regenerated its luminous power, for the same effects could be produced with it, although weaker. The phenomenon was afterwards observed in another way, and some specially remarkable results were obtained by pouring a small quantity of an ozone solution into a glass beaker containing ordinary water. At first the cone-like projection of the solution, where it falls into the water, becomes luminous; and then the light suffuses the whole mass as the liquids become thoroughly mixed, finally dying away. As to the light itself, Mr. Fahrig can only describe it as a soft phosphorescent glow, which quickly spreads over the mass of fluid or gas, as the case may be, and as quickly disappears. He does not seem to be able to explain the cause of its appearance, although several suggestions have been offered.

TECHNICAL RECORD.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Abstract Report of Proceedings.

The Twenty-ninth Annual Meeting of the North British Association of Gas Managers was held last Thursday, in the Academy, Perth. This is the sixth time of the annual meeting being held in that city. The second time, in 1865, the Perth Gas Manager, Mr. Thomas Whimster, served as President; the last being in 1880, when Mr. James Robb, of Haddington, held the post of honour. Both of these gentlemen are still "to the fore." Mr. Whimster serves the Corporation of Perth with great zeal and efficiency, and is hale and hearty, although apparently no longer on the junior side of man's allotted span of years. Mr. Robb is not only still "in the flesh," but is fully fourscore years of age. He is, however, no longer in active service, but takes a lively interest in the affairs of the industry with which he was so long and so honourably connected. There was a good attendance of members present in the large class-room of the Academy, when the President for the year—Mr. Samuel Stewart, of Greenock—took the chair. He was supported by a number of prominent members, including several Past-Presidents—Messrs. Whimster, M'Gilchrist, Alex. Smith (Aberdeen), M'Crae, MacPherson, J. Hall (St. Andrews), and W. Mackenzie (Dunfermline), who was for so many years the zealous Secretary of the Association. Mr. Stewart now occupied the presidential chair for the second time; his former tenure of the office of President occurring in 1876, at one of the meetings held in Scott's "mine own romantic toun," since which time the "Grey Metropolis of the North" has been three times visited by the Association.

The President opened the business of the meeting by making a few general remarks, and called upon the Secretary (Mr. R. S. Carlow) to submit the reports which had to be considered. The first was the annual report by the Committee. It dealt with the proposal to remit to Mr. W. Young and a Special Sub-Committee the consideration of the question of the purification of gas in closed vessels. Mr. Young had during the past year been so much engaged with other matters of importance, that he had not seen his way to having the ammonia purification process tested on a commercial scale; and to make any other form of trial would, in his opinion, have no really practical value. The Committee of the Association had taken the matter into consideration; and as there was no likelihood of the subject being brought up at an early date by Mr. Young, they had resolved to relieve the Special Sub-Committee of all further anxiety in reference to the question. They had also arranged, in accordance with a resolution of the last annual meeting, to have a report prepared on the question of "Selling Gas" by a Special Sub-Committee, which was to be submitted to the meeting at a later stage of the proceedings. Consideration had also been given to the propriety of appointing a Sub-Committee to make inquiries into the advisability of manufacturing and supplying water gas; but nothing had come of the proposal—the Committee's opinion being that there was no practical value to be derived from conducting any investigations into this process of gas making. As to Mr. Blair's offer to give two money prizes for papers on "The Advisability of Gas-Works supplying Electric Light," and on "The Utilization of Gas-Works Plant in making Cheap Gas for supplying Gas-Engines for Driving Electric Plant, and for Heating and Cooling, and in Direct Supply to Steam-Boilers," intimation of the prizes had been made in a circular to the members; but, to the regret of the Committee, no papers had been forwarded to the Secretary in response thereto. With regard to the Benevolent Fund, the report stated that it had been drawn upon to the extent of £15, as against £5 in the preceding year. The Committee's report also referred to the Statistical Report for 1889, to the annual report of the 1889 proceedings, and to the falling off in the membership, in consequence of some of the members being in arrears, by resignations, &c. On the other hand, there had been quite an equal number of new candidates applying for admission. With the resignations, &c., there had been a decrease to the extent of 19 associates and members of the various classes; making the actual list to include 237. But the candidates for admission included seven ordinary, six extraordinary, and three associate members; and with them the total membership would now be 234. The report for the year 1889-90 of the Murdoch Memorial Fund Sub-Committee stated that the fund now stood at £309 11s. 8d.; and it referred to the fact that the year 1892 would be the centenary of the invention of lighting by coal gas. It was therefore hoped to have the subscription list completed before this time, so as to perfect the arrangements for having a bust of the great inventor and benefactor erected in Westminster Abbey, and thus give him his proper place among Britain's greatest sons. The general fund of the Association was said to have a small balance in its favour; and it was stated that the Benevolent Fund had at its credit £195. There was at the credit of the Research and Investigation Fund a sum of £72 7s. 4d. The report by the Auditor (Mr. D. Bruce Peebles) was submitted by Mr. Carlow, in the unavoidable absence of Mr. Peebles, from whom there was read a letter in which he asked to be allowed to retire from

the office which he had occupied for the long period of fourteen years. The President made some remarks on the state of the funds, and expressed the hope that Mr. Peebles would continue to serve the Association in the capacity of Auditor. Mr. John M'Crae made reference to the valuable services which Mr. Peebles had rendered to the Association, and said he thought he would be likely to accept the post again if he were unanimously elected to it. He moved a resolution to this effect, and that the best thanks of the Association be awarded to Mr. Peebles. The motion was seconded by Mr. A. Smith (Aberdeen), and agreed to unanimously.

On the motion of Mr. R. Robertson (Bathgate), Messrs. Adamson and Smilie were appointed Scrutineers to examine the voting-papers for the office-bearers. Later on their report was submitted to the meeting, with the result that Mr. Robertson was elected President for the year 1890-91, and Messrs. A. MacPherson (Kirkcaldy) and T. D. Hall (Montrose) were elected Vice-Presidents. Mr. R. S. Carlow was continued as Secretary and Treasurer; and Messrs. G. R. Hislop, William Key (Tradeston, Glasgow), and John M'Crae were elected to fill vacancies in the Committee of Management.

In the course of the proceedings, it was stated that Mr. James Robb, one of the Past-Presidents of the Association, had sent in his resignation as a member. In referring to this matter, the President urged that Mr. Robb should be added to the list of honorary members. The suggestion was cordially approved of.

All the formal business having now been disposed of, the President proceeded with the delivery of his Inaugural Address, the full text of which is given in another part of the JOURNAL. Mr. Stewart made a few introductory remarks, and then went on to refer to some branches of gas manufacture in which improvements have been made during the past twenty-five years —that is to say, in the length of time that he has been in his present position of Gas Engineer at Greenock. These points included the carbonization process, the question of three-hour *versus* four-hour charges, the introduction of the regenerative system of heating retorts, and the building of retort-houses of large size, with abundance of ventilation and light. He was very decided on the question of the position of retorts—inclined, or horizontal as at present; his own conviction being that if any change took place it should be in the direction of vertical retorts, acting on the example set in the shale-oil works, where such great quantities of minerals are carbonized. Some valuable remarks were made by Mr. Stewart in regard to condensation and purification; and on the last-named topic he stated that his own system of removing sulphuretted hydrogen and carbonic acid did not cost more than from ¾d. to 1d. per 1000 cubic feet of gas. Still he thought that the Brin's oxygen system of purification could be profitably employed in very large works. He advocated the use of large purifiers, so that the process of purifying might be carried on as slowly as possible; and he had something to say regarding gasholders. The labour question was one on which he expressed somewhat strong convictions; indeed, he spoke of the gas stoker as being a skilled labourer, and worthy of some consideration in connection with the gas industry. The strongest point in Mr. Stewart's address was when recounting the experience of Greenock, over a period of a couple of years, in connection with electric lighting; his remarks on this topic being well worthy of consideration by gas managers and their directors, as well as by corporation gas committees, as they are the result of the observation of a man of great experience. Mr. Stewart is not an advocate of electric lighting being taken in hand by gas companies and corporations, but by electric light companies.

At the close of his most interesting and practical address, Mr. Stewart was awarded a hearty vote of thanks, on the motion of Mr. A. MacPherson, of Kirkcaldy.

After acknowledging the vote of thanks, Mr. Stewart stated that letters of apology for absence had been received from a number of the members, including Messrs. G. R. Hislop and R. Mitchell, Past-Presidents; and he announced that as Herr Klönne had not yet come forward to read the paper which he had promised through him (the President), it had been resolved to take as the first paper that by Mr. R. Robertson, which was on "Internal Gas-Fittings." [This paper is given in full elsewhere.]

The paper was a brief one; but the author's object was merely to introduce the question, on which he hoped a profitable discussion would arise. The subject of internal fittings had never been brought prominently before the members in the discussions of the Association, no doubt owing to the fact that such fittings lay rather beyond the domain of the gas manager, who had control of the mains and service pipes from the gas-works to the outer wall of the consumer's house, where it ceased; and the result was that his efforts in the way of improvement, both within and outside the works, to give a plentiful supply of good gas to his consumers, were very much handicapped by the bad internal arrangement of the pipes and fittings in their houses. He urged that the manager should have full control of the pipes from the works to the point of combustion; and it was for the members to find out how he might attain it. It was a matter beset with difficulties; but they surely were not insurmountable. All that the manager could do in the meantime was to give hints and suggestions to proprietors as to how to fix their pipes, and what appliances to use, so that full benefit might be derived from the gas consumed. These hints, unfortunately, were received rather suspiciously, and with looks as though the whole aim and object of the manager were to increase the gas bills. In the course of his paper, Mr. Robertson remarked that architects were very much to blame for the existing defects; and having been long a practical gas-fitter as well as a manager of gas-works, he was able to speak with authority and experience and a full knowledge of the whole subject. He had himself often thrown out hints, and had remedied the prevailing defects as far as lay in his power; but, without a proper warrant, his efforts had often been unavailing. He advocated some kind of compulsion in the matter, as was the case with the supply of water. Corporations and companies having control of the water undertakings laid down laws and regulations as to the quality of material to be used in the fittings inside buildings; and he held that similar regulations should apply to gas-fittings, and that all gas-taps and joints should be subjected to examination. He made pointed reference to the Dumbarton regulations in respect to gas-pipes and other internal fittings, and said it was to corporations that they looked to take the lead. The second part of the paper dealt in succession with pipes, gaseliers, and brackets, gas-moons, and burners, regarding each of which the author had some practical suggestions, which excited considerable interest among the members.

The discussion on Mr. Robertson's paper was opened by Mr. Whimster, who thought it lay rather outside the province of a gas manager to become a fitter. Mr. J. Hall (St. Andrews) said he would limit himself to merely giving advice; and he advised others to do the same. Mr. Alexander Smith (Aberdeen) was inclined to follow the advice of Mr. Whimster and Mr. Hall, and not interfere in the matter. The discussion was continued by Mr. J. Macdonald (Denny), Mr. J. Turnbull (Lauder), Mr. W. Cheyne (Briton Ferry), Mr. T. D. Hall (Montrose), and Mr. J. M'Crae (Dundee); most of the remarks in what may be called the second portion of the debate having reference to the question of wet *versus* dry meters as a portion of the internal fittings. Mr. Robertson having replied, a vote of thanks was accorded to him for his paper.

Mr. J. M'Gilchrist (Dumbarton) then proceeded to read a report on "Selling Gas," which had been prepared by a Special Committee of which he was the Convener. It was called forth as a result of the very novel paper read by the same gentleman at last year's meeting at Dunfermline, which had been communicated to him by Mr. Edwards, of Napier (N.Z.). The recommendations contained in that paper were generally approved of by the Committee and embodied in their report. [In connection with the report on "Selling Gas," there was circulated amongst the members a small handbill giving the standard sizes of gas-pipes for dwelling-houses and other buildings recommended by the Association.] The President made a few appropriate remarks upon the contents of the report, whose adoption (as representing the feeling and opinions of the members of the Association) he formally moved. The motion was seconded by Mr. Mackenzie, of Dunfermline, and unanimously agreed to.

The next paper submitted to the meeting was by Mr. Laurence Hislop (Uddingston), the subject being "Our Guide to the Purchase of Coal." He said his principal reason for dealing with the subject was that coal at the present time was affecting the gas industry in a very marked manner. He brought forward for the consideration of the members the method by which he had conducted the purchase of coal during the past sixteen years, only varying in some cases by advertising for offers instead of issuing a printed circular. He explained with some detail how he dealt with the offers as they came in, and from which he made an analysis or summary, the terms of which, especially in respect of the cost of coal per 1000 cubic feet, he embodied in a table. From this table, and from other information which he possessed as to the coals mentioned therein, he selected those best suited for the wants of his Company, and then made up a few mixtures to the extent to which they intended to purchase. These he embodied in another table. In the two tables referred to, of which copies were exhibited to the members (both of them applicable to the tenders for the supply of coal last year), his Directors could at once comprehend the whole of the offers, and in a brief space of time select the best value, and fix their contracts accordingly. In the course of his paper, Mr. Hislop was decided in stating that laboratory analyses of the coals offered were not a true guide in enabling them to purchase such coal as they desired to have to meet their special wants or circumstances. Mr. Hislop severely condemned the practice of selling coal by the results of laboratory analyses which were not borne out in some measure by practical working.

Mr. J. M'Crae opened the discussion on this paper; and he was followed by Mr. Vass (Portobello), Mr. P. B. Watson (Selkirk), Mr. A. M'Crae (Dundee), and Mr. A. Smith (Aberdeen). The President also spoke shortly on the subject; and a brief reply on the discussion was made by Mr. Hislop, to whom the thanks of the Association were heartily accorded.

An interval for luncheon took place at this stage of the proceedings. On resuming, the President announced the results of the scrutiny of the voting-papers (which have already been given in a former part of this summary report of the proceedings); and he also stated that Edinburgh had been fixed as the place of meeting next year. While this matter was under consideration, Mr. Robertson, the President-Elect, very feelingly thanked the members for conferring so high an honour upon him, and said that no effort on his part would be spared

to make the meeting of 1891 a success, and to maintain the high standing of the Association.

Mr. J. B. Terrace (Brechin) then read a paper on "Retorts Contracted at the Back End"—a subject which he briefly brought under the notice of one of the Glasgow "informal" meetings of gas managers fully two years ago. His invention has for its object the improvement of the construction of fire-clay gas-retorts, so as to facilitate the removal of carbon from them. As is well known, the ordinary method of constructing retorts leaves the back end at right angles to the bottom of the retort, and so favours the deposition of carbon at that end, and generally over a length of about six inches from it; and the removal of the adhering carbon is a difficult and troublesome operation. Mr. Terrace has his improved retorts so formed with inclined surfaces at and near the inner end as to produce obtuse angles with the bottom; and he claims that any carbon which deposits at the place mentioned is easily loosened, and comes away as from a mould, without requiring to be previously cut into two or more pieces.

The paper called forth a considerable amount of discussion; the consensus of opinion being in favour of the contracted retort. At the close, Mr. Terrace made a very brief reply; and he was awarded the thanks of the Association for his paper.

The last paper submitted to the meeting was on "The Transit of Material in Gas-Works;" the author being Mr. Gilbert Little, of London. The remarks in the introductory portion of the paper on the improvement of roads and highways and the number of Acts of Parliament passed in a certain year for their improvement, on the passion for the formation of canals towards the close of last century, on the progress of steam locomotion and steam navigation, on the abridging of space by notable bridges, seemed to the members to have only a distant relationship to the subject named in the title of the paper. Eventually, however, the author passed on to make pointed reference to the adoption of the New Conveyor Company's system of labour-saving appliances by Mr. George Livesey at the South Metropolitan Gas-Works, Old Kent Road. At this establishment the conveyors had been designed for dealing only with the coke which they collect from eight ranges of retorts, each about 180 feet in length, and deliver it to the coke-breakers, or transport it broken or unbroken to the yard or store as desired. This was spoken of as the most extensive coke-conveying system yet designed. The author next passed on to speak of the application of the Company's complete method of delivering coal along a range of inclined retorts, and the carrying away automatically of the coke from them to the breaker, the yards, or the stores, all as supplied to the designs of Mr. F. Morris, Engineer of the Brentford Gas Company. The most interesting portion of the paper was that in which was briefly described what, when completed, will be the most extensive conveying plant in the world, and which has been designed for Mr. G. C. Trewby, for the Kensal Green works of The Gaslight and Coke Company. In this case the coal is lifted with grab buckets from the barges at the rate of 80 tons per hour, and dropped on two self-cleaning screens. The siftings (about 90 per cent. of the whole) pass down conducting shoots into tray conveyors; while the tailings or lumpy pieces which pass over the screens, drop into the coal-breaker, and thence into the conveyor. Later on the coal is raised to a dividing hopper above the level of the retort-settings; and thence it passes, at the rate of 30 tons per hour, direct to a large conveyor, which distributes it along a double setting of inclined retorts, over 400 feet in length, and containing some 500 retorts. The remaining 50 tons per hour is sent from the dividing hopper into two conveyors, which extend along each side of the retort-house, and distribute the coal into 38 coal-stores, each measuring 30 feet by 21 feet by 18 feet, for the night supply or reserve stock, whence it can be taken, as wanted, into conveyors fixed underneath in arches, and from them may be delivered into the elevators, which, in turn, supply the charging-scoops. Passing from this, the greatest labour-saving conveyor plant ever designed, the paper next went on describe very briefly the system of conveyors devised for automatically distributing the oxide or lime in the purifying and revivifying department at the Burton-on-Trent Corporation Gas-Works—according to the plans of Mr. F. L. Ramsden, the Engineer and Manager. Brief mention was also made of the Conveyor Company's system for feeding the coal into the mechanical stokers on ranges of steam boilers.

There seemed to be a sort of "fog" over the mental grasp of the members while the contents of Mr. Little's paper were being laid before them, and the diagrams were being referred to. This was largely due to the defective acoustical conditions of the hall in which the meeting was held, for very few of the speakers were heard distinctly throughout the whole of their remarks, at any stage of the proceedings. Then, again, the diagrams illustrating the paper were neither large enough nor explanatory enough. Various members had something to say by way of commendation of the labour-saving appliances, and Mr. Little was cordially thanked for his paper.

As Herr Klönne had not arrived from Dortmund, it was proposed that when his paper came to hand it should be taken as read, and published in the Association's Transactions. Another suggestion was that it should be read at a special meeting to be held in the evening, in the event of Herr Klönne coming forward in time.

The remainder of the sitting was occupied with formal business Mr. Samuel Stewart (the retiring President), Mr. R. S. Carlow (the Secretary), and Mr. R. Robertson (the President-Elect) were nominated a Committee to superintend the publication of the proceedings; and, on the motion of Mr. M'Gilchrist, this was approved of.

In accordance with the recent practice of the Association, the retiring President was presented with the gold medal of the Association; this function being discharged by Mr. J. M'Crae, who was the most recent Past-President in attendance. He passed some well-deserved compliments on Mr. Stewart, who briefly replied, and thanked the members for the honour they had conferred upon him.

On the motion of Mr. Mackenzie, seconded by the President, a hearty vote of thanks was passed to Mr. R. S. Carlow, the Secretary and Treasurer, who briefly replied.

Lastly, the thanks of the Association were cordially given to the Directors of the Academy, for the use of their rooms; and then the President closed the meeting—adjourning it till July, 1891, when the thirtieth annual meeting of the Association will be held in Edinburgh, where no fewer than nine meetings have already taken place—the first one twenty-three years ago.

Inaugural Address of the President (Mr. S. Stewart, of Greenock).

Gentlemen,—In opening the proceedings of the twenty-ninth annual meeting of this Association, I have to thank you for the honour conferred in electing me to the office of President. It is gratifying to know that I hold your esteem to so large an extent as to be chosen to fill the important position I occupy to-day; and I shall endeavour to so conduct the business as to meet with your approval.

While the address of the President should be sufficiently interesting to be worthy of your time and patience in listening to it, it is not expected that he will be able to lay before you any new theories, or to suggest any novel alterations in the manufacture of gas, which will differ largely from the usual methods or revolutionize the present practice.

In the various addresses from the chair that we have had the pleasure of listening to, my predecessors have ably dealt with the early history of the manufacture of gas. They have drawn attention to the trials and difficulties of the earlier workers in the field of progress and discovery; and in considering, therefore, the particular direction the remarks that I have the honour of laying before you should take, it has occurred to me that as interesting a line as any would be to draw your attention to the present position of gas manufacture and its possible future.

It is now some fifteen years since I had the honour of addressing you from the chair. And as it is fully twenty-five years since I became Manager of the works of which I am still in charge, I propose pointing out the progress that has been made in the manufacture of gas during that time. It is true that some of my hearers have had a more lengthened experience; but it is during this period that the greatest advance has been made in improving the process, and that a general waking-up has been manifest—due to the fact that we have not a monopoly of the supply of artificial light, and that we have active competitors. The advantage of competition is acknowledged to be very great. It is to its stimulating effect that we owe the great change for the better that has taken place during recent years. The improved methods of carbonizing, the care given to condensation and purification, with the more rational methods of consuming gas, are all due to competition. Recent years have seen a large development in the use of gas for heating and cooking. Individual consumers now use it in larger quantities, owing no doubt to the more liberal treatment they receive; it being recognized that if business is to be pushed, it must be done as in the sale of other commodities—by selling at a low price and with as few restrictions as possible.

I need not detain you by saying much as to the past, except slightly as I proceed; the previous methods of manufacture are so familiar to you all, either from actual experience or from study, that it would be simply a waste of your time. Still it is not without advantage to compare our methods with what has been done before, if only in gratitude to the earnest minds who have preceded us, and the result of whose labours we have reaped. The present position of the process of gas manufacture was not reached in a single stride, but by the continuous thought and labour of many minds. We see the mistakes that were committed; and it is by a consideration of them that we are enabled to avoid their repetition. The fact that we find from time to time patents taken out for apparatus applicable to the various departments of gas manufacture which were tried and abandoned years ago, is in itself evidence of how advisable and necessary it is to study the past.

The carbonization of coal is conducted very much upon the same lines as it was in our younger days, although three-hour charges are now probably the more general practice, in place of the four-hour charges of former years; but as both systems are in use by experienced men in Scotland, their relative merits may be considered a matter of opinion. The introduction of the regenerative system of heating retorts is the most marked improvement of recent years; possessing as it does so many advantages—such as the opportunity it affords of working at higher heats and with greater regularity, as well at a less cost for fuel. A great improvement has also taken place in the size of our retort-houses. These are now made more spacious, and

with a greater regard to ventilation and light. It is recognized that these changes add greatly to the comfort of the men, and enable them to do their work with less fatigue.

Notwithstanding the endeavour made some years ago to introduce vertical retorts, and the success attending their use in shale-oil works, we still continue to set our retorts horizontally, in face of the inconvenience and labour attending the operations of charging and drawing. An experiment upon a large scale is about to be made to introduce retorts set at an angle, to be charged and discharged by gravitation, by which a saving in labour is expected. While wishing the experiment every success, I am of opinion that the arduous work of stoking is more likely to be abolished by the introduction of vertical retorts than of those set at an angle. But as either method will necessitate the use of machinery for lifting the coals, this will, except in works on a large scale, prevent any alteration from the existing methods. At the same time, it must be acknowledged that the present system of carbonizing is very crude, wasteful, and unsatisfactory.

It is certainly very singular, when one comes to reflect upon it, that in works carbonizing several hundred tons of coal per 24 hours, the same peddling method is carried on to produce the enormous quantities of gas required, as in small works carbonizing only a ton or two in the same time. Why the engineers of our large works are content to conduct their manufacturing operations on the same lines as those followed in small works, is a matter of surprise. It is less to our credit as engineers of Scotch gas-works, seeing that we have in our immediate neighbourhood huge shale-oil works carbonizing hundreds of tons of shale every day without the elaborate process we are content to continue in our works. It can only be from the fact that we are confined in our old grooves, and hesitate to take the initiative in a departure from our antiquated methods. But there is no question that, if we wish to keep abreast of the times, methods must be adopted to produce gas in bulk without going through the elaborate process of charging and drawing the retorts, and carbonizing only 2 or 3 cwt. of coal every three or four hours. Nothing so much strikes a visitor to gas-works, who sees for the first time the charging of the retorts, as the evident waste of gas that takes place during the operation; and when he is told that this is what has taken place for the past 70 or 80 years, he goes away with the idea that gas managers have very poor heads for invention. I think, therefore, the sooner we devote our minds to the removal of the slur the better; if we do not, we shall be having some outsiders coming in, and showing us the road. Indeed, it must be confessed that most of the improvements in the process of gas manufacture, in the methods of consuming gas, and in gas apparatus, have been made by men who are not actual managers of gas-works.

I may here remark that a cry has been raised by some among us against "traders" being members of our Association. I object to the term; it has something offensive to my mind. It may be correct when applied to one who simply buys and sells; but when applied to a trained engineer—a man, perhaps, of skill and scientific acquirements often above those possessed by the average gas manager—it is most offensive. I may take the liberty, as an old engineer and gas manager, of saying that it is to the skilled and scientific gas apparatus manufacturer that we are indebted for many of the improvements which have been effected in all departments of gas plant. While, therefore, I have no desire to encourage one who simply trades in such plant to become a member of our Association, I consider the skilled engineer who manufactures gas-works plant or appliances, from retorts to burners, as much a gas engineer as one who is actually in charge of a gas-works, and therefore it is only just to acknowledge our indebtedness to him.

During the past few years, many kinds of condensers have been introduced, and various methods tried for the removal of the tar and heavy oils without injury to the illuminating constituents of the gas. But, after all, the old lines are still very generally followed. The principle upon which gas should be cooled or condensed is, however, better understood. The advantage of lowering the temperature of the gas slowly is now recognized. Experience has taught us that if the gas is rapidly cooled, a considerable quantity of the illuminants will be carried down, and that the cooling should not be continued to an extremely low point, as by so doing a serious deterioration of the illuminating power will occur. The process of tar distillation for the recovery of naphtha and light oils reveals the fact that a very considerable quantity of the illuminants have been removed from the gas, either in cooling or by the absorption of the tar, amounting to about 5 per cent. of the crude tar. The great advantage of these constituents being retained in the gas is therefore evident. The formation of tar and liquor takes place from the moment the gas leaves the retort; and supposing the hydraulic main is kept hot, it is found, even at a moderate distance from the retort, that a considerable quantity of tar and liquor are separated out.

It is said that the formation of clouds is due to the presence in the atmosphere of minute particles of dust—so minute, in fact, as to be invisible to the naked eye, and some scarcely discernible under a microscope. Yet these form nuclei upon which the vapours condense into water, forming the visible clouds and fogs. In other words, these vapours must have some solid body, however small, upon which to condense. It is very possible that the formation of tar in the gas is due to similar causes—the minute particles of sooty or carbonaceous matter that comes over with the gas forming the basis upon which the hydrocarbon vapours condense into tar; and as this process must commence the instant the gas leaves the retort, it goes largely to explain the rapid formation of this constituent, as found in the hydraulic main, and to show that its formation is as much due to this cause as to the lowering of temperature. Granting that the formation of tar may be attributable in part to this condensation on the particles of solid matter that comes over with the gas, it follows that it is of great importance that the gas and tar should be kept hot until an opportunity occurs to permit of the tar as formed settling out of the gas, but at the same time to prevent it, by cooling, absorbing the light hydrocarbon upon which the illuminating power of the gas depends; and that form of condenser is the best which allows of the removal of the tar and condensed water vapours as formed.

After distillation, there cannot be a doubt that the process requiring the most careful attention and scientific skill on the part of the gas engineer is that of condensation. It is so vital to the successful carrying on of the process of gas manufacture, that he may, by unskilful methods, necessitate a large expenditure for expensive cannel or other enriching material, and thus seriously affect the profitable results at which he is aiming. The importance of this department of gas-making must be my excuse for dwelling so long on this part of my subject.

At the time I have taken for my comparison it was thought scarcely possible to remove the whole of the ammonia in the gas by means of water alone—the excessive use of water being deprecated from its known power to absorb the lighter hydrocarbons; and methods involving the use of acids were tried. But the introduction of scrubbers, using them of considerable height, or several of less dimensions, has proved the possibility of totally removing the ammonia at this stage of the process; showing that if the water is not too long in contact with the gas, its injurious effects are not so great as were anticipated. Indeed, to judge by the large quantity of ammoniacal liquor now produced per ton of coal carbonized in most gas-works, it would be supposed that some of our friends are of opinion that a too plentiful quantity of water could not be employed. This is, however, a mistake, and too much caution cannot be exercised, while aiming at a large production of ammoniacal liquor, that it is not obtained at too great a cost in the absorption of the light-giving constituents of the gas. Those who make sulphate of ammonia are aware that, in the distillation of the liquor, quantities of naphtha are sometimes given off; and as these come over at a comparatively low boiling-point, it is evident that they are formed of the lighter hydrocarbons—thus showing that the water does remove from the gas its illuminating constituents. It cannot be doubted, nevertheless, that the whole of the free ammonia can be taken up in the scrubbers, and in combination with sulphuretted hydrogen and carbonic acid. The daily testings now made in most gas-works prove that little or no free ammonia is allowed to reach the purifiers—to the great comfort of those who have to clean them, and to the surrounding neighbourhood, and also, I may add, to the profit of the gas undertaking. There is a tendency at the present time to revert to the old plan of washing the gas by placing a washer between the condensers and the scrubbers, to take up any tar that may have passed the condensers, and thus to prevent the clogging of the scrubbers. But I should much fear that, in removing the tar, some of the light hydrocarbons are carried away with it; though not having tried a washer in this way, I am not prepared to express any opinion on the system. Perhaps, however, some of our friends may be able to give us their experience in dealing with cannel coal; for it is possible that gas having a comparatively low illuminating power may not be affected to the same extent as gas of 25 candles or upwards.

With regard to purification, there is little difference in the methods in vogue now from those formerly employed. Since the system of wet lime was discarded, dry lime or oxide (or both) is still the purifying agent, and it is used in the same manner as of old—in comparatively shallow boxes; there not being the variety of forms in use as in condensation. The endeavour of gas managers to arrive at a solution of the problem of carrying out the whole process of purification in closed vessels has not yet been arrived at. Several methods have been suggested, where oxide solely has been employed; but as lime alone is chiefly used to remove the sulphuretted hydrogen and carbonic acid in Scotland, the methods suggested have met with little acceptance. Ammonia is still the only impurity removed in closed vessels, excepting in so far as it assists, by combination with the other impurities mentioned, in their partial removal; and I am afraid it will continue to be so until means are devised to increase very largely the production of ammonia in the crude gas. It is well known that if we could produce a sufficient quantity of free ammonia, the whole of the other impurities could, by their combination with the ammonia, be removed; and the simplest solution of this difficult question will be by introducing methods for the distillation of coal by which greater quantities of ammonia may be obtained, as is done in the distillation of shale in oil-works. This will further depend upon the nature of the coal or shale dealt with. It is to be remembered, however, that while it is of the greatest importance that attention should be given to solving this question, it is not of such vital importance, in a pecuniary sense, as would be

supposed from the remarks made by some in regard to it. The removal of the sulphuretted hydrogen and carbonic acid seldom costs more than ¾d. to 1d. per 1000 cubic feet, including labour and materials. If the cost had been greater, I have no doubt the difficulty would have long since been overcome.

One of the methods recently brought before gas managers for cheapening the process of purification is by the use of oxygen, made by Brin's process; but while this is a very ingenious system, and useful for many purposes, it is not of general acceptance in Scotland, except in the largest works, where the saving would amount to a considerable sum. It is said that one-half the cost of purification by lime or oxide would be saved; but as I have before remarked, our average cost for material and labour seldom exceeds 1d. per 1000 cubic feet, and is in fact often less; and when account is taken of the cost of the plant for the production of the oxygen, the labour and attention required in working it, the royalty asked of ¾d. per 1000 cubic feet, the wear and tear of the plant, and the contingencies of the manufacture, I believe that the margin of saving to be effected by the use of oxygen would be so small as not to encourage, except in a few works in Scotland, the expenditure of money in erecting plant, which would increase the cares and anxieties of gas managers. In the meantime, taking all things into consideration, we must therefore be content, in the item of purification, to take advantage of the better knowledge and greater experience prevailing at the present day, and endeavour to cheapen the process of purification by using purifiers of increased dimensions, as we now know that, in order to effect the most efficient combination between the purifying material and the impurities we wish to remove, the gas must be passed as slowly as possible through the purifiers. To do this, purifiers of proportionately large areas must be employed; and the larger the better.

The chief matter remaining for comparison, so far as gas plant is concerned, to which I have to refer, is that of gasholders. Whatever may be the view held as to the amount of advance which has taken place in other sections of gas-works, there cannot be any difference of opinion as to the great development which has been witnessed in the construction and size of gasholders, and the amount of attention their further development is receiving. The introduction of three-lift holders is a most important advance, especially in large towns where land is valuable; and their action appears to be as undoubted as that of the two-lift holders with which we are familiar, but which, when first introduced, were thought to be a very daring innovation. The erection of holders without the usual guide-framing is of too recent introduction to enable one to express an opinion upon it; and, in the meantime, I would prefer to trust to the old-fashioned methods of guiding.

Drawing this portion of my remarks to a close, it will be acknowledged that, in recent years, the science of gas manufacture has made very great progress; and with the scientific training gas engineers are now receiving, and the necessity that exists for striving for improvement and economy in every department, caused by the strong competition to which gas lighting is subjected, the advance in the future may be expected to be quite as great as it has been the past.

In consequence of the success of the stokers' agitation in London, by which they obtained the same rate of pay—viz., 5s. per shift—for eight hours that they formerly had for twelve, the movement rapidly spread throughout the United Kingdom; and generally with success. Considering the very trying work of gas stokers, no one can object to them, with the other employees in gas-works, sharing in the prosperity which has accompanied the manufacture of gas during recent years, to which they have so largely contributed. It is but fair and just that they should do so; but it is open to question if so large a reduction as 30 per cent. of the time the men are on duty is of much practical advantage to them. The nature of the work necessitating continuous labour day and night, it cannot readily be divided except into shifts of eight or twelve hours—changing at stated times to the day or the night shift alternately. This makes the men's hours of leisure come at such times as very frequently to prevent them employing it to any definite advantage. With ordinary tradesmen, who are only employed during the daytime, a shift of eight or ten hours, leaving ample leisure at convenient seasons for mental improvement, is of immense advantage. But with gas stokers, it is different; and seeing that the actual time they were employed was certainly not more than half the hours on duty, I think that practically they would have been wiser to have continued the twelve-hour shift at a moderately increased pay. There is no doubt, from the opinions expressed by several of our friends who have had a lengthened experience of the system of eight-hour shifts, that it is found that the men, from their shorter hours of labour and longer rest, do their work more readily and with less exhaustion; and that consequently, while the eight-hour system is more expensive, there is the advantage of the work being better done.

During the past 25 years there has been a decided improvement in dealing with the question of labour in gas-works. The men are not only more liberally paid, but methods have been adopted by which the fatiguing nature of the work to be performed has been reduced. In addition to this, the well-being of the men is better cared for, as evidenced in the reduction of Sunday labour; the introduction of regenerator furnaces enabling this to be almost entirely done away with, especially for one of the shifts, where the eight-hour system has been introduced. It is only just to say that, while there are annoyances from individual irregularity amongst stokers, they seldom, as a rule, take to combination or resort to coercion by leaving the works suddenly. The Conspiracy and Protection of Property Act provides that men under contract shall not leave without giving due notice. But contracts with stokers would be a great inconvenience, as where retorts are put out of action, there is no other work as a rule to which they can be put to, except temporarily, and to ask a man to engage to give so many months' service and yet be subject to dismissal at a moment's notice is inconsiderate and unfair. It follows generally, therefore, that stokers are not employed under special written contracts. If dissatisfied, stokers have, unfortunately, ample means of making the works suffer; and, generally speaking, managers prefer to run the risk of the hands leaving them, to incurring the annoyance of men wasting coals or continuing to do their work in an insubordinate manner.

The recent combination or union of labouring men has shown their importance in the economy of labour. Those whom I am addressing need not be informed that the gas stoker is a skilled labourer—it may be a very elementary kind of skill, but it is such that it cannot be acquired at any moment, as some imagine, and as has been shown during the recent strikes. The skilled mechanic is necessary, and cannot be done without; neither can the labouring man. It is upon him that the bulk of the work we have to do depends; and now that he has discovered his power, and entered into combination, he must be reckoned with. He cannot for the future be regarded as a necessary evil, but must be treated with as a factor in the world's progress, like all other classes.

Having submitted such observations upon gas manufacture as I thought might serve to interest the members of the Association, I have deemed it desirable to close my remarks with a short reference to a competitor in the field of illuminants—namely, electric lighting, which has excited considerable interest for some years past and still continues to do so. It will be admitted that the electric light is an active competitor not to be ignored, but deserving of earnest attention.

Mr. Blair, of Tillicoultry, was kind enough to offer the sum of £10 for prizes for the best papers on the subject of gas-works supplying the electric light; but unfortunately there has been no response to his offer. Having had the experience of supplying a section of Greenock with the electric light for a couple of years, I am able to speak somewhat confidently of the possible results of a gas-works furnishing electric lighting. In Greenock, I may explain, we fitted up two dynamos, each equal to 100 incandescent lamps of 20-candle power; and they were driven by a turbine water-wheel and gearing. Only one dynamo was run at a time; but both could have been worked if there had been a demand for the light. The plant was erected on ground belonging to the Water Trust, some two miles from the gas-works; and it was complete in all respects, and provided with necessary testing apparatus. Some 25 incandescent lamps were employed in the streets—being put into the ordinary gas-lanterns; and part of a sugar refinery was fitted up with 85 incandescent and two arc lamps. The whole of the mains and cables were carefully laid under skilled supervision, and worked with entire satisfaction. During the summer, only one man was employed; but in the winter months another was taken on during the daytime, renewing and repairing the lamps, &c. Something like 1000 yards of cable and 2500 yards of wires were laid, including branch services to lamps, all put underground. The wires were double lead-covered, having high insulation, safety fuses, and distributing boxes. The district lighted outside the Water Trust ground was about 300 yards long by 100 yards wide. The total outlay on plant was £1630; wages and working expenses came to about £150 per annum, exclusive of interest, depreciation, cost of supervision, and power. Had these been included, as in the case of gas supply, the expenditure would have been three times this amount. The sugar refinery was fitted up by the proprietor at a cost of upwards of £200 for the 85 incandescent and the two arc lamps. They paid the Gas Trust about £100 per annum for the supply of electricity, and 10s. per week to a man for looking after their lights. The expenses for one year, as estimated by the proprietor—including 5 per cent. on the outlay for wires and lamps, the renewal of the lamps and carbons, the payment to the Gas Trust, wages, &c.—amounted to £175; while their gas account for the portion of the refinery lighted by electricity came to about £125. Finding, after a second year's experience, that their expenses were increasing, they decided to give it up, and return to gas lighting. The Greenock Police Board, objecting to go on incurring an annual outlay for the few remaining lamps, stopped the experiment. If they could have induced parties to fit up a number of lamps equal to the full power of the dynamos and plant, their yearly expenditure would not have been proportionally increased; that is to say, supposing the consumers fitted up the plant within their premises, and maintained it and attended to the renewal of the lamps. It is evident that the electric light cannot be supplied at anything like the cost of gas. Gas is the light of all classes of consumers; but the electric light from its excessive cost, can only be the luxury of the rich.

As to the advisability of gas companies furnishing the electric light, it must be borne in mind that, from the expensive nature of the plant required, the capital necessary to supply a whole

town would be so great as to prevent this being done; and all that an electric light company would do would be to select those parts of a town where there were shopkeepers willing to use it for advertising purposes, or whose stocks were such as would be injured by the products of combustion or the heat of gas, or where there were wealthy people willing to have the light for the novelty of the thing. Where gas is sold as cheaply as it is in most towns, there is no risk of the general adoption of electric light. The introduction of the light must be so gradual, that the natural increase in the consumption of gas which takes place in most towns, would prevent its effect on the demand for the older illuminant being injuriously felt.

There is no part of a gas-works plant that can be utilized for the production or supply of electricity. The cost of laying cables from a gas-works to the locality proposed to be supplied would, in most cases, be so large that it would be necessary to erect plant in the immediate neighbourhood of the district. If a gas company were to take in hand the supply of the electric light, it would necessitate putting capital into a new business having special plant and skilled labour and supervision entirely different from a gas business. In order to make it pay, active competition with the gas business would be needed; and one need hardly add that this can scarcely be done by those who find it requires all their energies to make gas-works pay, and at the same time provide a cheap and efficient light. In my opinion, the supply of electricity should be left in the hands of those companies who specially take in hand such work, and gas companies should no more trouble themselves with it than they would with the supply of oil to those who prefer to burn this illuminant instead of gas—oil being a much more active competitor than electricity.

I have now only to add that I hope the very interesting papers which some friends have kindly prepared, and which will be read to you, will receive your earnest attention, and elicit ample discussion; and to express my warmest wish that the future prosperity of the Association will be as great as the past has been. I have no fear that everything will be done to merit success by the able men who will have charge of its affairs.

INTERNAL GAS-FITTINGS.

A Paper read by Mr. R. Robertson, of Bathgate, at the Annual Meeting of the North British Association of Gas Managers.

There is no necessity for an apology in bringing before the Association the subject of internal gas-fittings. It is one of great importance to every gas manager; the greater part, if not the whole of the everlasting complaints dinned in his ears about bad gas being due to the insufficient and badly-laid pipes, the "shoddy" brackets and gaseliers, and the old burners and moons of his consumers. This paper is brief. It does not fully go into the matter—my object being merely to introduce the subject, which I trust will be followed up by profitable discussion. Although important, and no doubt pressed home upon us almost daily in our several spheres of work, the subject of internal fittings has never been brought prominently before us in the discussions of our Association, no doubt from the fact that interior fittings just lie beyond the domain of the gas manager. He has control of the mains and service-pipes from the works to the outside wall of the consumer's house, and there it ceases; the result being that his efforts in the way of improvement, both inside and outside the works, to give a plentiful supply of good gas to his consumers, are very much handicapped by the bad internal arrangement of the pipes and fittings in their houses. There will have frequently come under your observation cases where two houses equally advantageously placed for the supply of gas (similar size of main, service-pipe, and meter) show a great difference in illumination—a difference due to the superior fittings in the one, and the inferior fittings in the other. Of course, in the latter case the gas is blamed; and one would almost think the consumer had the idea that a special kind of gas was sent from the works to certain customers. What is needed is that the manager should have full control of the pipes from the works to the point of combustion; and how he may attain this it is for us to find out. It is a matter beset with difficulties; but surely not insurmountable.

In the meantime, all that the manager has can do is to give hints and suggestions to proprietors as to how to fix their pipes, and what appliances to use, so that full benefit may be derived from the gas consumed. Unfortunately, in the majority of cases, these hints are received rather suspiciously, and which looks as though the whole aim and object of the manager were to increase the gas bills. The suggestions about even a gas-burner, far less as to piping and gaseliers, are regarded in the light of self-interest; while the glowing tale of the itinerant burner-seller is credulously listened to, and 6d. paid freely for burners usually sold by ironmongers and gas-fitters for 1d. each. In these days when paraffin oil is so cheap, and so much taste is displayed in the get-up of lamps for burning this illuminant, we must look to our laurels; for, in a number of cases, the consumers who resort to oil-lamps, as being better than gas, do so because of a dificient supply.

Architects are very much to blame for existing defects. All that a gas-fitter receives from him, when a new house is being erected, is a specification stating the number of feet of the different sizes of pipes required. No details, or plan, or declivities are given; and the mode of laying is left entirely to the gas-fitter himself. If he has taken a job at a cheap rate, he will endeavour to use as little pipe as possible, without giving much thought about the gas supply. I have been connected with the gas-fitting trade for upwards of thirty years, and have had to contend with low prices; and my experience is that architects, knowing themselves next to nothing about laying gas-pipes, too often leave it to the gas-fitter to do as he thinks fit; and it is annoying to a proprietor, after his house has been expensively papered and painted, to have the walls cut up to remedy defects which would have been obviated had a proper plan been furnished. Of course, it cannot be expected that an architect or an overseer can be familiarly acquainted with every trade carried on under his eye during the erection of a building; and it is here that I would suggest that the services of the gas manager should be asked, to give particulars as to what pipes should be used, and how they should be fixed up. This necessarily entails every manager being conversant with the principles of internal gas-fitting.

During my long experience as a gas-fitter, and my shorter experiences as a gas manager, I have often thrown out hints, and remedied the prevailing defects as far as lay in my power; but without a proper warrant my efforts have been often unavailing. We must arrive at some kind of compulsion in this matter, as is the case with our water supplies. Corporations and water companies having control of the water supply lay down laws and regulations as to the quality of material to be used in the water-fittings inside buildings. The pipes must be of certain sizes and weights; and the cranes or taps or other fittings must be subjected to a standard pressure, and be stamped accordingly. I hold that similar regulations should apply to gas-fittings, and that all gas-taps and joints should be subjected to a like examination. In the town of Dumbarton there is a fixed standard of the sizes of pipes to be used; and unless this is conformed to, the supply of gas is refused. The works there belong to the Corporation; and it is to corporation gas-works that we look to take the lead in this matter, for they have considerably more power in an affair of this kind than the directors of a company.

I will now deal separately with the different parts of internal gas-fittings.

Pipes.—Pipes used for gas-fittings are of three kinds—viz., malleable iron, composition, and block tin. The first material is the best for mills and factories where steam power is used, as, from its hardness, it is not liable to be cut or break at the fastenings in consequence of the vibration caused by the working of the machinery. Of this sort of pipe, the galvanized is superior to the other, as no rust collects inside, as is sure to do in the ordinary kind; and in course of time obstruct the gas supply.

The second kind of piping is composition, of which there are two classes—tinned and untinned. The tinned is a good article for ordinary use, and is extensively employed in country buildings. I have fitted up a great many places with it, and have found it to do very well; but the use of the untinned kind I would condemn as altogether unsuitable for gas-fitting purposes. It is too easily bent, and is thus always ready to "bag;" while from the softness of its nature it gathers moisture easily, and produces that disagreeable jumping of the lights often seen.

The third class of pipes are of block-tin; and these are by far the best that can be used. It is hard, easily laid, rarely gathers moisture, and altogether makes a tidy piece of work. This material is often objected to as being more expensive than the others; but when weight for weight is compared, it will be found that the difference is not so great as supposed, because two yards of block-tin pipe weigh nearly the same as one yard of the other. I strongly recommend the use of this class of piping in preference to all others; and advise that it should be fitted up wherever possible. I had intended to give in detail the diameters of pipes most suitable for the various sizes of buildings; but as this is to be treated upon in the Committee's report, it is needless to travel over the same ground.

Gaseliers and Brackets.—Of the variety of design and construction of gaseliers and brackets there is no end. Unfortunately, a great number of those at present in the market are of a light and useless description; the joints and taps being from the very first unsound and leaky. The material is light, and lasts only a short time; and as in many cases they are got up for outward show, they prove to be more ornamental than useful. What can be expected from the gaseliers one sees advertised at the wonderful price of 4s. 6d. and upwards? There should be fewer chains and less struck work about gaseliers than are usually attached to them. I am in great favour of doing away with the sliding joints, and thus dipensing with the water-joint and the balance-weights—the former dangerous in time of frost, and the latter equally dangerous at all times. It is surprising that more accidents do not happen as the result of falling weights. The gaselier fitted with a ball-and-socket joint at the ceiling, and made of a fixed length to suit the room it is placed in, would serve all purposes as well as the more elaborate kind, and all risk of accident would be obviated. We, as gas managers, should condemn in every possible way the use of the light and faulty gaseliers and brackets which are flooding the market at the present time. Let me remark here that whatever articles are purchased for illuminating purposes, it is by all means essential to get the most substantial.

Gas-Moons.—Just a word about the gas moons or shades used for the ornamentation of gaseliers and brackets. There is great room for improvement in the style of moons in general use. In the majority of cases we find moons so deeply obscured as to take away from 15 to 25 per cent. of the light; while the opening at the bottom is so narrow as to cause a current to pass through the moon, and thus further reduce the illuminating power of the gas. There is necessarily a great waste of gas from these causes. Of all the defects in internal fittings, this is the one most easily remedied, either by having the light bare, or, if inclined for ornament and a mellow light, using what is called the "Comet" moon—that with a wide opening at the bottom and a narrower one at the top. The former prevents the current of air from passing on to the flame, and the latter causes a deflection of the light. This mode is greatly superior to the older style, and should be brought before our customers as prominently as possible. Since beginning to collect the notes that were to form this paper, Mr. Gardner, of Glasgow, has patented an adaptation to the "Comet" moon which increases the illuminating power of the gas used, and is much the same idea as I had myself formed as to increasing the luminosity of the gas; the material, however, being of a different kind from the patented article.

Jets.—The subject of gas-burners has often been brought before our Association; but I am not sure that it has borne the fruit it should have done. I think the flat flame union-jet burner is the best for ordinary purposes; and it is the duty of all gas managers to be continually drawing the attention of their consumers to their renewal at short intervals. If the expense is an obstacle, I am satisfied it would be to the benefit of gas companies to supply them free.

In bringing these rambling remarks to a close, I trust you will excuse all deficiencies that have occurred, and fill them up by a full and free discussion upon what I consider to be one of the most important departments of our profession.

RECENT IMPROVEMENTS IN GAS-ENGINES.

At the last Meeting of the London Association of Foremen Engineers and Draughtsmen, a paper was read by Mr. H. T. Crew on the above subject, in the course of which he sketched the history of the gas-engine as a motor, and described the latest improvements effected therein.

The author commenced by pointing out that the idea of a gas-engine was not new, as a specification exists of a motor to be driven by a gaseous explosive mixture which is nearly a hundred years old. Want of general mechanical knowledge and the high price of gas, however, prevented the early inventors from attaining commercial success; and it was not until 1860, when the Lenoir engine was introduced, that the gas-engine became of practical utility. The principle of this engine was simple, and in appearance it resembled a steam-engine. The piston moving forward draws into the cylinder a mixture of gas and air at atmospheric pressure through an ordinary slide-valve. At about half-stroke the valve cuts off, and the ignition is effected by an electric spark; an explosion following which drives the piston to the end of its stroke, when the exhaust is allowed to escape, and the operation repeated at the other end of the cylinder for the return stroke. He said the effective power of these engines was small, and the gas consumption high—about 100 cubic feet per brake horse power per hour; but they established the practicability of the gas motor, and engineers and scientists gave much attention to its improvement. In 1867 the "Otto and Langen free piston engine" was introduced, which had a flame ignition, and did its work with less than half the gas consumption of previous engines. About that time the advantages to be derived from compressing the mixture of gas and air before explosion were freely discussed; and in 1876 the now well-known "Otto" engine was introduced, which embodied this principle in a practical form. The whole cycle of operations necessary for the working of this motor is carried out during the period of two revolutions of the crank-shaft; giving two outward and two inward strokes of the piston—first drawing in the charge, then compressing it, then firing and expanding it, and lastly expelling the products of combustion. This cycle was, the author thought, as simple as could be devised in a compressing engine having one cylinder only.

Mr. Crew then described the various systems of ignition in use, and the difficulties experienced in adapting them to a compression engine, until Dr. Otto introduced his slide ignition, and showed how comparatively easy it was to introduce a flame at atmospheric pressure into a cylinder containing an inflammable mixture at 40 lbs. above it, without its being extinguished. The most modern form of ignition was suggested in 1848 by Siemens, but recently modified and improved to practical success. This is the hot-tube ignition; which, in its simplest form, consists of a small iron tube closed at one end and open to the cylinder at the other. This is heated to redness by an ordinary Bunsen burner; the explosive mixture under compression being forced into it, and fired by contact only. The moment of ignition can be varied within certain limits, so as to correspond with the proper position of the piston for firing by heating the tube at a greater or less distance from its junction with the cylinder, and more accurately by employing a timing-valve, which only permits the inflammable gases to enter the hot tube between certain limits of time, and fixes the ignition between those limits.

The author next explained the principles and general arrangement of the "Atkinson" engine, which completes its cycle of operations during one revolution of the crank-shaft; the "Linford" engine, which takes three revolutions to complete the cycle; and the "Griffin" engine, which involves a modification of the Linford principle, and completes the cycle in one and a half revolutions. The "Linford" is a double-acting slide-valve engine, of which the cycle is as follows: The piston, starting from the back end of the cylinder, draws in a charge of gas and air during the whole of its outward stroke, then returns, compressing the mixture. After the commencement of the next outward stroke, the charge is ignited; the expansion continuing until the end of the stroke, when the exhaust is discharged at about 30 lbs. pressure. The piston returns, expelling the products of combustion, and on its next outward stroke draws in cold air only, which is expelled by the return stroke; leaving a clear cylinder for the next cycle of operations. Precisely the same thing occurs in the front end of the cyclinder; the explosions being exactly alternated as the other features of the cycle, and an impulse given to the crank-shaft on opposite sides every one and a half revolutions, and in double-cylinder engines at every three-quarters of a revolution—resulting in steadiness of driving.

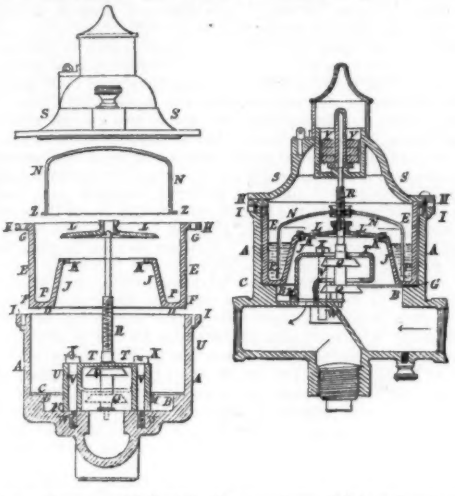
In the author's opinion, gas-engines compare favourably with the best steam-engines in economy; for it has been shown that in the latter only about 10 per cent. of the heat generated is converted into useful work, whereas in the former 20 per cent. is turned into work, while 50 per cent. is lost by radiation through the cylinder walls, &c., and 30 per cent. escapes with the exhaust. But as gas-engines are comparatively new, a much greater economy may be looked for in the near future.

One of the latest improvements in gas-engines is the "Nash," which is manufactured by the National Meter Company of New York. This engine has the merit of compactness of design; and therefore occupies but little space. It is stated to work well with ordinary illuminating gas, to run very steadily, and to require very little care to keep it in order. The combustion or power chamber is formed partly in a separate hood, and communicates at one side of the latter with the supply valve-port. The forward end of the power cylinder opens into a casing at the base, which forms a compression supply chamber, of which the piston is the compressor. In this chamber, the connecting rod and crank work, and into it the combustible mixture of gas and air is drawn during the upward stroke of the piston through a mixing-valve, which is placed externally. This valve automatically regulates the relative proportional supply of gas and air to the cylinder, so that the charge is of uniform quality and density. Air enters through the opening at the bottom; the flow of gas being regulated by a valve. In the interior are two valve ports of unequal area, with which a double-seated valve operates by its weight vertically to control the flow of gas through the smaller valve and the flow of air through the other. The relative quantities of air and gas drawn in by the suction created by the upward movement of the piston are in accordance with the size of the air and gas openings. From the supply reservoir the mixture passes upwards through a passage. Its admission to the combustion chamber above the piston is controlled by a valve of the poppet type, having an ample seat. The quantity of gas admitted at each stroke is controlled by a valve operated by a governor. The igniter is based upon a new principle. The igniting jet of combustible mixture is caused to rotate in the circular chamber, into which it enters through a passage tangentially placed. This forms a vortex of flame, which is positive and simple in its action. The valve moves in a reamed hole in the case, being so loosely fitted as to drop of its own weight, and yet making a gas-tight joint. Since the valve is perfectly balanced as to gas pressure, it moves without friction; and therefore requires a very small quantity of oil—just sufficient to prevent it becoming dry. The valve is made long, and the lower part has a bearing in that portion of the case kept cool by a water-jacket. As oil is only applied to the lower end, very little can work up to the hot end, where the igniter is heated; hence the formation of gummy oil is prevented, and the valve seldom needs cleaning. It is stated that in actual use the case and upper end of the valve never come into metallic contact, as, on account of the looseness of fit at that point, a scale of hard carbon is formed over the surface of each, which protects them from abrasion. The valve is positively operated by an eccentric on the shaft. The piston connection operates without friction. Held rigidly to the piston is a hardened and ground steel block, against which the end of the connecting-rod, which is also hardened, rests. The rod has no sliding movement—it simply rocks on the bearing-pin. It is held in place by a yoke; and as the pressure on the piston is always downward, the yoke is not subject to strain. The engine ignites the charge at every revolution; and the amount of the charge is controlled at each stroke by a governor. The fly-wheel is stationed between two bearings formed in the single base casting, and hence the alignment of the shaft is always true. The working parts are enclosed and protected from dust, and at the same time they are readily accessible by hinged covers. This engine may be operated with gasoline gas as well as fixed gas.

REGISTER OF PATENTS.

Gas-Governors.—Stott, J., of Fleet Street, London. No. 12,663; Aug. 10, 1889. [8d.]

These improvements connected with gas-governors will be appreciated by a reference to the engraving, in which fig. 1 shows the several parts of the governor separately, except that the valve-box and valves are in their working positions in the outer casing.



A is the casing provided with the usual gas inlet and exit ports at the lower part. This casing has upon the inner step B an indiarubber or other ring C as a cushion, on which the bottom D of the mercury cup E finds a seating when inserted into the casing, and pressed down upon the ring to prevent the passage of gas into the space between the walls of the casing and the cup. The outer wall of the mercury cup from F to G corresponds in height with the wall of the casing from the step B to the top edge G, and it terminates in a projecting flange H, which sits upon the top rim I of the casing. The tapered wall J of the mercury cup terminates about half-way up the casing, and has on its inside a couple of lugs K, to enable the shield L to be fastened down upon it by short screws. This shield, when in place, prevents the mercury flowing into the lower well M should the apparatus be titled to too great an angle. N is a bell which dips in the mercury in the bason P. It, and also the valve Q to the spindle R (to which they are attached), is bouyed up by the pressure of gas, which passes through the apparatus in the usual well-known manner for governing purposes. S is the cover, which can be tightly screwed down upon the flange H; the screws being inserted into separate holes to the flange screws and engaging in the top rim I. T is the valve-box; and at its two corners U, holes are formed through them for the passage of long screw pins V, which engage in the base W of the casing, so as to fix the valve-box T in position. The heads X of the screw pins are above the box.

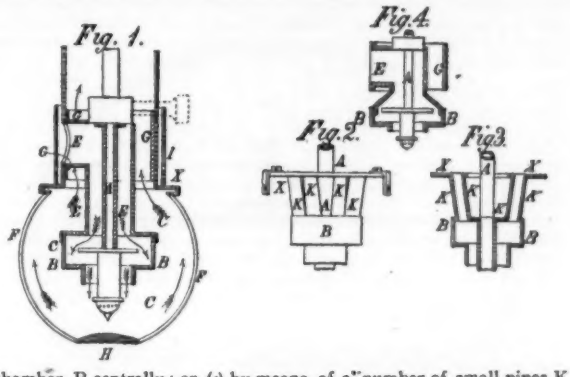
By this arrangement of governor, the interior can be easily inspected without interfering with the joints by which the casing A is secured to the gas-supply pipes. By first removing the cover S, the bell N can be released from the spindle R. The cup E is next unfastened, and raised out of the casing; and the screw pins V are taken out, and also the valve box T. Should however the valves alone require attention, it will not be necessary to remove the cup, but only the cover S, bell N, and shield L, and the screw pins V; the aperature in the top of the tapered wall J being sufficient between the lugs for the valve-box T to pass through.

Fig. 2 shows the apparatus in section, with all the parts in their respective positions when the governor is in operation. The bell N is kept in balance by the pressure of the gas under the resistance of the weights Y, in the manner now well known. Z is a lip on the bottom edge of the bell N, to offer an impediment to its rapid rising should the supply of gas be suddenly turned on.

Regenerative Gas-Lamps.—Lewis, J., of Tottenham. No. 12,915; Aug. 15, 1889. [8d.]

This invention has for its object to simplify the construction of regenerative burners or lamps (so as to render them less liable to get out of order, and otherwise improve their effectiveness), and at the same to effect economy in their cost.

The gas is supplied through a central vertical pipe A (as shown in fig. 1, which is a vertical section of a lamp) to the burner, which is advantageously a jet burner with a series of small holes arranged in a circular form; the pipe being connected to either a vertical supply-pipe, as shown, or to a side connection out of the chimney (as shown by the dotted lines) so as to form a bracket lamp. Over the burner is arranged a box or hollow chamber B—to which air is supplied in any of the three ways hereafter described—approximately circular in form with a flat or nearly flat top and bottom thereto, and with a flange forming an annular space around the enlarged part of the pipe A; this flange being formed on the bottom side of the outlet, so as to direct the air on to flame. The bottom thus has a clear opening around the gas-pipe for the heated air to pass out to support combustion; and the products of combustion have a free passage C away to the chimney D all round the chamber. The air supply is conducted to the chamber B from the exterior of the chimney, by means of (*a*) a single large pipe or passage E in the shape of an elbow or bend, which descends vertically and centrally in the lamp to the chamber B; or (*b*) two or more smaller pipes or passages (not shown in the drawings) enter the heating



chamber B centrally; or (*c*) by means of a number of small pipes K (shown in figs. 2 and 3) arranged towards and around the outer edge of the heating chamber B. In this case the small air-tubes K will pass through the plate X on the end of, and outside the chimney, which in this case would be made much smaller in diameter.

In the case of No. 1 arrangement, a disc or baffle-plate having a larger area than the inlet or diameter of the large tube E is mounted horizontally beneath such inlet in the chamber B, so as to spread the air current therefrom, and prevent its passing in a direct line to the burner through the outlet passage of the chamber B. This dispenses with the use of wire gauze, or some other suitable material, over the outlet. A similar baffle-plate is mounted to act in a like manner with No. 2 arrangement. With No. 3 arrangement (shown in figs. 2 and 3) this baffle plate is dispensed with, as the bottom of the chamber B acts as a baffle plate to the inlet currents.

In Nos. 1 and 2 arrangements, the gas-inlet pipe A (unless the gas be admitted from below, as on a "pillar" lamp) and the air-supply pipe E or pipes—to which latter is firmly secured the heating chamber B—may be secured to a ring or hollow drum G of a diameter corresponding with the internal diameter of the chimney D, to which the parts are attached or detached by screws or other fastenings.

The bottom (externally) of the heating chamber B forms a disc or surface for spreading the flame, and also ensuring the heated air coming in due contact with the top side of the flame. The burner and heating chambers are enclosed by a glass globe F having an opening H in the bottom, covered with wire gauze to admit air to the underside of the flame; or, if desired, double glasses may be used, as described in patent No. 6154 of 1885. A shield I is mounted on the outside of the chimney to protect and cover the air inlet E.

Fig. 4 shows a modification of No. 1 arrangement—the only difference being in the shape of the top of the chamber B, which in this case is conical. The whole of the parts are formed together, and are secured in position in the chimney D by screws or otherwise; and the glass being attached, the lamp is ready for use.

In order to reduce as far as possible the shadow thrown upon the ceiling, it is advantageous to so arrange the parts that the burner, heating chamber B, and part of the air-inlet pipe E (or pipes), are sunk down into, and are surrounded by the glass globe F, which may be of any suitable form for the purpose.

Revolving Retort or Furnace for the Distillation of Coal.—Yeadon, J. A., and Adgie, W., of Leeds. No. 19,183; Nov. 21, 1889. [8d.]

This invention was so fully described and illustrated in the JOURNAL for April 29 last, p. 787, that it is now only needful to specify the claims the patentees make. They are for: (1) the use or application of a revolving retort for the distillation of coal or other analogous purposes, substantially as described; (2) the use of the above, combined with interior blades, for breaking up the coal, and gradually working it forward to the discharging end; (3) the use of the above, combined with recessed end-plates or mouthpieces, fitted with suitable packings and rings for preventing the escape of gas or ingress of air; (4) the use of the above, combined with a feed hopper, cylinder, internal shaft, and knives, at the feeding end, by which the coal can be regularly and continuously fed into the retort; (5) the use of the above, combined with sliding-doors or other mechanical arrangement at the outlet end for discharging the coke without waste of gas; (6) the use of the above, combined with coal elevators and endless conveyors to feed any different number of hoppers and retorts.

Charging Gas-Retorts.—Trewby, G. C., of Hampstead Heath, N.W. No. 19,256; Nov. 30, 1889. [6d.]

The chief object of this invention is to spread the coal evenly in the retorts by means of a moveable division plate, which prior to charging is inserted into the retort and temporarily divides it into two longitudinal chambers. A hopper which may or may not be combined with the moveable division plate is employed to guide the coal into the desired portion of the retort, whereby "the coal is laid in an even column between the moveable plate and the flat side or bottom of the retort." When the retort is charged, the hopper and plate are removed, and the end made up in any suitable manner.

Figs. 1 and 1A [next page] are front sectional end views of gas-retorts; figs. 2, 3, and 4, side elevation, plan, and end views respectively of a retort on a reduced scale, to all of which the improvements are applied.

A is the retort to be charged with coal; the retort being shown in the small views inclined or set obliquely; but it is obvious that the retorts may be set horizontally. In order to spread the coal evenly, a division plate B is employed, which has attached to it a strengthening web of metal C. These parts are shown in fig. 2 connected to a hopper D provided at E with a moveable door, not shown, which divides the hopper D from a shoot or trough F fitted below the division plate B and formed with it.

In charging retorts set obliquely the operation is as follows: The

Fig. 1.

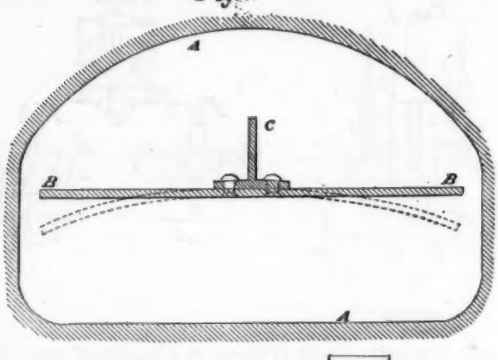


Fig. 2.

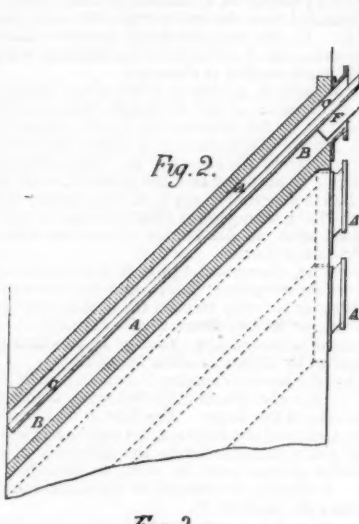


Fig. 4.

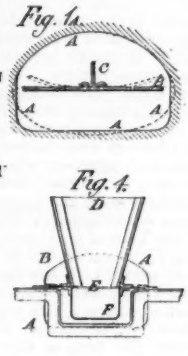
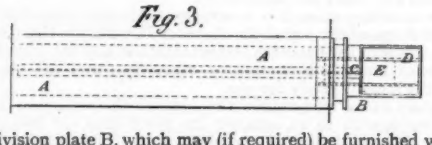


Fig. 3.



division plate B, which may (if required) be furnished with guide-pieces to maintain it in its proper position, is placed in the retort so as to divide it longitudinally from end to end; the hopper and shoot, where employed, occupying a position as in fig. 2, with the door at E closed. The hopper is preferably just large enough to hold sufficient coal to charge one retort; so that when the hopper is filled, and the door E opened, the charge of coal passing through the shoot F into the retort will be spread evenly along its whole length. The division plate, with the hopper, are now drawn forward ready to be used in charging another retort; while the filled retort is ready to have its mouth made up in any suitable manner.

Gas-Meters.—Mitchell, R., and Lawson, C., of Montreal, Canada. No. 5372. April 8, 1890. [8d.]

The claim made for these improvements in gas-meters is that they "will register with accuracy up to a higher pressure than can be done by any now in use;" also that the working parts are more durable, and can be more easily cleaned and put in order when needful.

Fig 1.

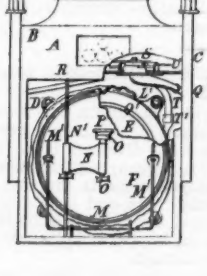


Fig 6.

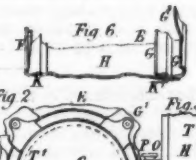


Fig 2

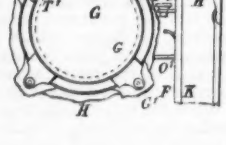


Fig 3

Fig. 4.

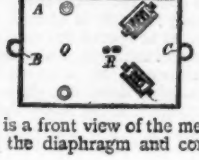


Fig. 5.

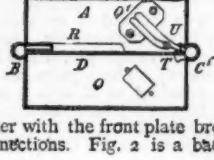


Fig. 1 is a front view of the meter with the front plate broken away, showing the diaphragm and connections. Fig. 2 is a back view of the diaphragm. Fig. 3 is a side view of same; and fig. 4, a top view of the valve-plate. Fig. 5 is a horizontal sectional view, looking upwards; and fig. 6, a section through the diaphragm.

The well-known parts of a gas-meter in which no change is made, and which are not necessary to illustrate the invention, are not shown. A is the frame of the meter; and B and C respectively the inlet and outlet pipes, with openings between them and the inlets into, and exhaust from, the diaphragm. These latter are of comparatively small sectional area compared to that of the pipes B and C; and, although it is impossible to give an absolutely definite rule for the relative proportion of the pipes and ports in each of the different sizes of meters, it has been found (say the patentees) that in a 2-light meter—*i.e.*, one passing 12 feet of gas per hour, in which the pipes are ¾ inch in diameter—ports of $\frac{5}{16}$ inch answer very well. In meters of larger capacity, the proportion of the area of the ports will be somewhat increased; but the openings into the diaphragm will also preserve the same proportion—*i.e.*, each will be equal to the area of both the ports, *plus* a small addition. By this means the pressure of the gas in the diaphragm is rendered even, whatever may be the initial force; and it may be raised successively to double the height now attempted with meters as hitherto constructed. E is the diaphragm; F, the front plate; G, the back one; and H, the expansible leather. On the side of each of the plates there is a flange composed of a double bead with grooves between. In these grooves are laid the edges of the leather, which are secured in place by lengths of wire K K^1, having one end soldered to the turned-up edges of the plates (usually before the leather is laid on), and wound round over the leather, so as to hold it firmly in place in the grooves, and make a perfectly tight joint; the other ends of the wire being secured in any suitable way. By this means all necessity for the application of heat to secure the leather and plates together is done away with; and all chance of hardening the leather (so as to cause it to crack in use) is obviated. On the back plate are formed a number of lugs G^1, through which pass screwed pins projecting from the division D; threaded nuts screwed on them holding the diaphragm to the division D. In this back plate is cut a concentric aperture, closed (as shown in fig. 6) by a plate G^2, which may be soldered in place or secured to G. This plate, when the diaphragm is taken out of the frame, is easily removed; giving access to the interior of the diaphragm without the necessity of taking apart the plates and leather, which enables an unskilled workman to do all that is required for cleaning the diaphragm.

The mechanism in connection with the front plate F is somewhat modified to allow of the withdrawal of the diaphragm from the meter. The ends M^1 of the motion wire M are vertical throughout their length, and pass through eyes projecting from F and set horizontally. The centre N is mounted on the vertical rod N^1 as usual, and is so arranged that the eyes O O^1 formed in arms projecting horizontally in a vertical line from the front plate F, can be disengaged from the ends of the outer pin. Into the eye O is screwed the bush P. When the threaded nuts are unscrewed from the pins, the diaphragm E is detached from the division D; and by unscrewing the bush P, the diaphragm is free to be taken out. To replace it in position all that is needed is to exactly reverse the operation just described, finally securing the lugs G^1 to the division D.

In figs. 1, 4, and 5 is shown (as far as is required for illustrating the present invention) the arrangement of the parts for effecting and regulating the influx and efflux of the gas. Q is the valve plate, to which are secured separate plates Q^1 carrying the gratings and valves governing the supply of gas to the diaphragm—all of the usual type. R is the inlet taken from the pipe B to the top chamber S; and T is the pipe from this chamber to the diaphragm, the upper part of which may be made in one with the plate Q, and the lower T^1 (that connected with the diaphragm) being a slip joint. The flange of the diaphragm, at the point of junction of the pipe, may be flattened out to receive it. U is the exhaust taken to the outlet-pipe C. In removing the diaphragm, this slip joint is simply disengaged from the pipe T as it is lowered.

APPLICATIONS FOR LETTERS PATENT.

10,329.—Love, J., "Improvements in and relating to apparatus for the manufacture of gas for illuminating and other purposes." July 3.

10,466.—Moore, F., and Fieldhouse, W. J., "Improvements in gas heating stoves." July 7.

10,500.—Bull, J. C., "Improvements in ignition apparatus for gas and vapour engines." July 7.

10,551.—Jardine, J., "Improvements in gas-reversing valves for regenerative and other furnaces." July 8.

10,597.—Lake, H. H., "Improvements in water-meters." A communication from the Rogers Liquid Meter Company. July 8.

10,609.—Brown, A. O., and Brown, J. K., "Improvements in gas-lamps, commercially known as sunlights." July 8.

10,642.—Vogelsang, O., and Hille, M., "Improvements in the valve-gear of gas and petroleum engines." July 9.

10,644.—Brown, A. O., "Improvements in regenerative gas-lamps." July 9.

10,698.—Goehde, R., "Improvements in cocks for mixing gas and air." July 10.

10,713.—Bugby, W., "An improved portable apparatus for charging inclined gas-retorts." July 10.

10,718.—Grob, J. M., Schultze, A. O., and Niemezik, A. V., "Improved means for effecting the ignition of vapour in gas and petroleum motors." July 10.

10,831.—Vestrant, L. Van, "Improvements in means and apparatus for charging inclined gas-retorts." July 12.

10,869.—Priestley, G. F., "Automatic machinery for charging and discharging gas-retorts." July 12.

10,884.—Brown, J. K., "Improvements in gas governors or regulators." July 12.

10,889.—Dinsmore, J. H. R., "Improvements in gas-engines." July 12.

10,925.—Welford, R., and Ridealgh, W. R., "Improved starting apparatus for gas or vapour engines." July 14.

10,952.—Griffin, S., "Improvements in apparatus for regulating and governing the admission of gas and air into gas motor engines." July 14.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Gasholder Construction.

SIR,—I am very sorry that it devolves upon me to question the accuracy of Mr. Cripps's history, which he pronounces "true history," of the evolution of gasholders without guide-framing. In his letter in last Tuesday's JOURNAL, he puts it on record that Mr. Webber made a proposal or suggestion to guide a gasholder with guide-framing 6 feet high; and he then says that, "to all intents and purposes," this was a method for doing away with the guide-framing—that is, *entirely* abolishing the upper framing.

Now when historical accuracy is attempted, such a loose expression as "to all intents and purposes" should not be employed. But the words refute themselves, for, if the 6-feet guiding were removed, there would remain nothing whatever to guide the holder. In fact, the dwarf guiding of 6 feet high, or thereabouts, was the entire suggestion or method of Mr. Webber. It was fallacious, as Mr. Cripps himself helped to show. Nevertheless, it was the study of this fallacy (I will not repeat the word "absurdity") which first set me thinking whether it would be possible, by some sound mechanical method, to not merely find the "irreducible minimum" of guide-framing, essayed by Mr. Webber, but to abolish the same entirely. I shall not question whether or not Mr. Livesey first set the idea rolling in the direction of "reduction" of guide-framing, because at the time of my entering the field I had not seen what Mr. Livesey had said. But it appears certain that he was the first to actually reduce this framing by one lift; and he deserves every credit for the achievement. Mr. Webber thought this reduction could be carried further. But there is no indication in his writings that he dreamt of entire abolition; as, indeed, would be inconceivable on the lines of his proposal, which involved some guide-framing above the tank as a necessity.

I have always sought to give Mr. Webber full credit for his work; and I have never failed to acknowledge that it was the study of his proposal which caused me to enter the field. I do, however, utterly deny that Mr. Webber ever put forward any proposal or described any method which can be construed, rationally, into an *entire* abolition of the external or upper guide-framing of gasholders; and I further say that my spiral guide was the first proposal ever made to do this.

Manchester, July 23, 1890. WILLIAM GADD, C.E., F.R.M.S.

Mr. Gadd's Gas Institute Paper.

SIR,—As I cannot spare time for more than a short notice of Mr. Gadd's reply, in last Tuesday's JOURNAL, to my article on the above subject in the number for the 15th inst., I will only allude to a few of the more important points.

I accept, of course, Mr. Gadd's explanation that, in the hurry of preparing his paper for The Gas Institute, he confused a "West Indian hurricane" with an "English storm;" but the mistake does not occur in the pressure per square foot allowed—viz., 50 lbs. instead of 25 lbs, (although, I may parenthetically remark, 50 lbs. is more generally taken in England as the pressure per square foot than 25 lbs.)—but in the way in which the distributed wind pressure is afterwards treated, in applying half the total distributed pressure at a point 20 feet high instead of 40 feet high. This Mr. Gadd acknowledges is erroneous; and he explains that it was a "pure slip of some kind." He cannot, however, go further with me in my "conclusions as to the true disposition of the total." I can only repeat that if we treat the holder as Mr. Gadd did—viz., as fixed at eight points, at equal distances apart, around the circumference of its base (the dead weight of the holder itself being disregarded, in Mr. Gadd's paper)—the strains will be as I gave in my article. Mr. Gadd distinctly states that "the vertical force on *each* rail acting in contrary directions on opposing sides" would, according to his working, be 1250 lbs. (or, if we accept his correction, referred to above, 2500 lbs.). This is absolutely incorrect. It should, as I proved in my article, be not less than 6666 lbs. on the most severely strained rail.

Mr. Gadd endeavours to show that I am wrong in my figures, by introducing other aspects of the question; but instead of proving that there is less strain on the supporting points than I gave, the tests of accuracy he now proposes give exactly the reverse, as the following will show: If we consider the gasholder as turning on the opposite side as a fulcrum, it will not diminish the strains in the slightest, but will considerably increase them; because, if the entire depressing force on the opposite side is to be concentrated on *one* guide-rail as a fulcrum instead of being distributed over half of them, the vertical force on this particular rail would be 20,000 lbs., or 16 times as much as Mr. Gadd's original figures. The strongest possible arrangement is when the neutral axis passes through the centre of gravity of the section—*i.e.*, as per figures 3 and 4 in my article. The vertical force on the most severely strained rail is then at least 6666 lbs. I had no desire to exaggerate this force, and cannot understand Mr. Gadd's reason for proposing a treatment which would multiply it threefold.

Mr. Gadd says: "By experiment on a model, and indeed it is apparent, if all the top rollers on the guide-rails be removed excepting the two Mr. Cripps marks as on the neutral axis, the holder is still held down by those two rollers only." I am aware of that; but does Mr. Gadd really wish us to infer from this that those particular rollers have any appreciable force acting upon them when the other rollers are not admitted? Unless he does, I fail to see the point. If this *is* his contention, it is easily proved to be erroneous; but if he does not mean this, I fail to see how it in any way disturbs the accuracy of my figures.

I would respectfully ask Mr. Gadd, if (as he says) he knew that *the pressure on the various points depends on their respective distances from the neutral axis of the system*, why he did not acknowledge this principle in his treatment, instead of representing that the vertical force on *one* side only was distributed *equally* over all the *eight* points, and why he ignored the vertical force on the other side altogether.

I think I have now made it clear that the objections raised to this part of my criticism have no weight whatever in them.

Mr. Gadd passes lightly over my comments on his treatment of the "diagonal forces." It would be interesting to know what other engineers think of his method of dealing with these strains in his paper. For my part, I must express surprise that Mr. Gadd should have written what he has on this branch of the subject.

Respecting the *plus* and *minus* signs, Mr. Gadd says he has "nothing to correct here." I will only ask your readers to compare my figures 6 and 7 with Mr. Gadd's figures 3 and 4. Take for example fig. 3. The *plus* sign on the left-hand side, from which the force acts, indicates that that side of the beam is in *compression*. But a glance is sufficient to make it apparent that the material on that side is stretched in bending, and therefore in *tension*. The sign should therefore be *minus*, not *plus*. Then glance at fig. 4. The *plus* signs at the bottom are on the wrong side. The side that is stretched, and therefore in tension, is represented by Mr. Gadd as being in compression. This is wrong. Fig. 4 represents the strain as *zero* in the centre. This cannot be correct if the character of the force is the *same* at the top and bottom on the *same* side as it is represented to be by Mr. Gadd. If it is zero in the centre, it must change from *minus* to *plus* as you go up the post; the neutral point being in the centre of its height—that is assuming that the connections and bars at the top and bottom are equally rigid. If they are not equally rigid, the neutral point will approach the weaker one, until, when the connecting-bar becomes very shallow—say, a straight line—zero coincides with it. We then have practically the same conditions as represented in my fig. 6. If Mr. Gadd still has "nothing to correct" in his paper on this point, I am sorry to say that I do not "know" that he perfectly understands "these every-day little assistants." But possibly he has made a "slip of some kind."

I might very easily follow up every clause in Mr. Gadd's letter, and I think, without exception, prove them to be entirely erroneous. Those with which I have dealt I have chosen because they are the only ones in any way relating to the mathematical determination of the strains, and therefore the most important. Upon the personal remarks in Mr. Gadd's letter, I, of course, make no comment.

July 25, 1890. F. S. CRIPPS.

The London Water Supply Inquiry.

SIR,—I am much indebted to you for affording me an opportunity of calling in question the accuracy of the reporter's notes of the proceedings at the above inquiry, upon which you have founded a series of animadversions upon the evidence I gave before the Committee. It so happens that I have seen only two or three brief notices of the fifth and seventh days' proceedings, none of which seem to me in any way to confirm the accuracy of the quotations you gave in the JOURNAL for the 8th and 15th inst. The *City Press* of the 12th inst. gave a very fair report, in which I note only one mistake in reference to the cost of the process of softening hard water, not of 1 gallon, but 1000 gallons. I stated on the authority of an eminent water engineer (Mr. Fairbank) that the cost of softening water was only one-eighth of a penny per 1000 gallons. This is a very trivial error compared with those into which your reporter seems to me to have fallen. I am quite ready to admit that I entered into matters of a controversial nature; but I respectfully submit that gibes and sneers are not arguments, nor will the use of them be calculated to carry conviction to my mind that I am in the wrong and you are in the right on the question of the London Water Supply. At any rate, it was my desire to state set truth, even on debateable grounds—to "nothing extenuate, nor the down aught in malice." Now, although I have not the official report before me, I am perfectly certain that I never said anything half so silly, and so far from the truth as that "the River Roding flows into the Lea, and contaminates the water supply of the New River Company." Neither did I assert that "the highly contaminated waters of the Roding is taken direct into the reservoirs of the Water Companies," and that "no end of sewage matter is allowed to pass in the New River," &c. In short, scarcely one of the references to my evidence on either of the days I attended before the Committee bears more than the slightest resemblance to the truth. Of this you have the means of verification if you will only be at the trouble of obtaining a copy of the official report of the proceedings.

My intention was to bring home the fact to the public mind that there is always a lurking danger behind water taken from open rivers—especially some of the rivers about London, all along the banks of which an ever-increasing resident population believe in their right to pour any amount of slush into them; or by residing, during the summer months, in house-boats, unwillingly contaminate the water, and which Conservancy Boards are powerless to deal with and prevent. For the truth of this, I have only to refer to the failure of the action recently taken by the Lea Conservancy Board. At this moment, a very grave and dangerous instance of contamination is presented to our notice by the Officer of Health of the Guildford Urban Sanitary district. This gentleman reports to the Local Government Board an alarming outbreak of typhoid fever among the work-people employed at Messrs. Spicer's paper manufactory at Farncombe. This outbreak is entirely owing to the water pumped from the adjacent River Way, which is used for drinking by the factory hands, 24 of whom are stricken with fever. This river it is known is largely contaminated by sewage. The excrementitious matters of the town flow into it; and possibly no effort is made to keep them out; at all events, it must be well known to the Conservancy Board that the foul poisonous water of the Way finds an outlet into the Thames, and above the intake of the Water Companies. The public danger in such a case can hardly be exaggerated or over-estimated, and notwithstanding the chemical evidence and certificate of its "organic purity." No medical man, however, at the present day would be likely to be betrayed, by a chemical analysis of water, into a belief that, because it presented to the eye a bright appearance, it may be taken to be free from the poisonous microbe of fever or of cholera, and could be safely used for dietetic purposes. But the mention of anything of the kind is to risk being accused of spreading abroad unnecessary alarm.

1, Bedford Square, W.C., July 23, 1890. JABEZ HOGG.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

During the past week the following progress was made:—

Bills read the first time: Electric Lighting Provisional Orders Bills (Nos. 10 and 12); Tottenham Local Board Bill; Warrington Extension, Water, &c., Bill.

Bills read a second time and committed: Electric Lighting Provisional Orders Bills (Nos. 1 to 9, and No. 15).

Bills reported: Electric Lighting Provisional Orders Bills (Nos. 1 to 9, and No. 14); Liverpool Corporation Bill; Sutton, Southcoates, and Drypool Gas Company (Electric Lighting) Bill.

Bills read the third time and passed: Electric Lighting Provisional Orders Bills (Nos. 1 to 9, and No. 14); Glasgow Corporation Bill.

Bills Royal Assented: Belfast Corporation Bill; Higham and Hundred of Hoo Water Bill; Gas Orders Confirmation (No. 2) Bill; Huddersfield Water Bill; Newcastle and Gateshead Water Bill; Stockton and Middlesbrough Water Bill; Wallasey Local Board Bill; Walsall Corporation Bill; Water Orders Confirmation Bills (Nos. 1 and 2).

HOUSE OF COMMONS.

During the past week the following progress was made:—

Bill read the first time: Electric Lighting Orders Bill (No. 14).

Bills read a second time and committed: South Lincolnshire Fen Water Bill.

Bills reported: Bradford Corporation Water Bill; Electric Lighting Provisional Orders Bill (No. 11); Gas and Water Orders Confirmation Bill.

Bills read a third time and passed: Dewsbury and Heckmondwike Water Bill; Electric Lighting Provisional Orders Bills (Nos. 10 and 12); Morley Corporation Water Bill; Tottenham Local Board Bill; Tunbridge Wells Improvement Bill; Warrington Extension, Water, &c., Bill.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Wednesday, July 23.

(*Before Mr. Justice* DAY *without a Jury.*)

The Mayor and Corporation of New Windsor v. The Windsor and Eton Water-Works Company.

This was a case arising out of the proceedings in connection with the transfer of the Windsor and Eton Water-Works to the Corporation of Windsor; and the facts were shortly as follows: Some years ago Mr. W. H. Cutler and his trustees established water-works at Windsor (at first without any statutory authority), and expended considerable sums of money upon them. Subsequently he obtained an Act of Parliament constituting him and his trustees a Company, and giving them power to extend the works. In 1882 he again applied to Parliament for further powers, and the Bill passed the Committee of the House of Lords, by whom a clause was inserted giving the Corporation of Windsor the option of purchasing the undertaking at a fixed price. Thereupon the Bill was dropped. In 1883 another Bill was introduced, and this passed. In accordance with one of the clauses of the Act, the Corporation of Windsor gave notice of their desire to purchase the water undertaking; and an arbitration was held to determine the price to be paid. The agreement for arbitration recited that the Directors of the Company had paid to Mr. Cutler the sum of £3111 5s. 3d. as the costs, charges, and expenses of the applications to Parliament, of which £1156 11s. 3d. represented the costs of the abortive application in 1882, as to which Mr. Cutler gave an idemnity to the Directors, in case it should be determined that they were not liable to pay them. It was this sum of £1156 which the plaintiffs now claimed, on the ground that it was part of the capital of the Company which had been expended by the Directors *ultra vires*. The amount of the purchase-money awarded by the Umpire was £131,600; but this question was not decided in the arbitration—in fact, it was expressly excluded.

Mr. GRAHAM (with Mr. CHANNELL, Q.C.) appeared for the plaintiffs; Mr. COCK, Q.C., for the defendants; and Mr. DICKENS for Mr. W. H. Cutler.

Justice DAY, after hearing the arguments, decided that the Corporation had no claim of any sort or kind to the money referred to in the deed of indemnity, which was not included in the valuation on which they bought the property. He gave judgment for the defendants with costs, including the costs of Mr. Cutler.

WESTMINSTER COUNTY COURT.—Wednesday, July 23.

(*Before His Honour Judge* BAYLEY.)

St. John's Hospital for Diseases of the Skin v. Heavens and Co.—An Unsafely Hung Outside Lamp.

In March, 1889, the defendants supplied and fixed a large hanging lantern, weighing upwards of half a hundredweight, outside the St. John's Hospital, in Leicester Square. A year afterwards the lamp, while being cleaned, fell to the ground; and the action was brought to recover the cost of replacing the lamp—it being alleged that it had been improperly fixed, especially in the omission to attach safety shackles, which would have prevented the accident. The defendants said they had fixed hundreds of lamps without such shackles, and did not deem them to be necessary except with very heavy lamps.

His HONOUR gave judgment for the plaintiffs for the amount claimed.

On the application of Mr. J. G. LEMON, who appeared for the Hospital authorities, costs were granted on the higher scale.

MISCELLANEOUS NEWS.

THE SOUTH METROPOLITAN GAS COMPANY AND THEIR PROFIT-SHARING SCHEME.

Abstract of the Rules—Mr. G. Livesey advises Thrift—The Workmen and the Scheme.

Our readers may remember that the original agreement submitted to the workmen in the employ of the South Metropolitan Gas Company, in regard to the scheme initiated by Mr. George Livesey for giving the men a share in the profits of the undertaking, contained a notification that a Committee to be composed of equal numbers of workmen and officers, and presided over by the Chairman, would be formed to settle all details. This was accordingly done; and a set of rules has been framed by them to govern the profit-sharing contracts. These rules have been examined from a legal standpoint by Mr. Mark Knowles, Barrister-at-Law; and they were approved by the men on the 18th ult. The following summary gives their chief features:—

The scheme, as is now well known, is based on the sliding-scale principle, which regulates the Company's dividends in accordance with the price charged for gas. For the profit-sharing arrangement, the initial price is taken at 2s. 8d. per 1000 cubic feet. When it rises above this figure, there is to be no bonus; but for every penny it is reduced below it, a bonus of 1 per cent. on his salary or wages is to be paid to each officer and workman, so long as the Directors are satisfied that it is for the mutual benefit of the Company and its servants. Rule 1 specifies that only those employees who work under written agreements are to be entitled to the bonus. The way in which the bonus is to be estimated is explained in Rule 2:

The bonus shall be calculated on the ordinary salary of the officers, and on the daily wages earned by the workmen in the course of the year, which for this purpose shall end on the 30th of June in each year—no account being taken of overtime; and those workmen who may be on piece-work shall have their bonus calculated on the amount they would have earned at their ordinary rate of wages in the regular working hours.

No deduction will be made on account of absence caused by sickness, unless the total amount of such absence exceeds two calendar months in the year. The bonus is not to be regarded as earned until the 30th of June in each year, or until the agreements for the short terms expire; and no employee or his representatives will be entitled to any part of the bonus until the above-named date, or such term as may be set forth in the agreements for short periods, except in case of death, or leaving the service of the Company. Rule 5 is as follows:

On the declaration of the bonus on the 30th of June in each year, or on the completion of the term specified in the agreement, the bonus shall become the absolute property of the employee, who shall have the right to withdraw the whole or any part of the year's bonus, or whatever amount, including interest (excepting the nest-egg), which may stand to his credit in his account with the Company, upon giving not less than seven days' notice, at any time (and for such purpose a special form will be provided). Otherwise the bonus will remain with the Company, and be entered in a pass-book with which the employee will be provided; and under no circumstances whatever, except fraud, shall the bonus, with the interest (if any) so credited, be forfeited.

The winter men are to be allowed to leave their bonus with the Company, at interest, for any period not exceeding twelve months. Interest at the rate of 4 per cent. per annum will be allowed on all amounts, excluding fractions of a pound, left with the Company; but no interest will be allowed for any time less than three months, should the money be withdrawn at any intermediate period. Rule 8—an important one—is as follows:

The Company will in addition to the bonus that may be placed to the credit of any workman, receive and add to his account such amounts as the workman may be able to pay to the Company from his savings; and on all such sums so received, the Company will pay interest at the rate of 4 per cent. per annum, subject to the following conditions: (1) The Company will receive at any time amounts of not less than 2s.; (2) the total amount deposited in any year shall not exceed £30.

The Company will, on the application of any of their employees, make arrangements for the transfer and investment of the money deposited, or any other money the men may desire to invest, into the stock or shares of the Company, which will pay to the investors about 5 per cent. interest. Any workman may nominate a person as his representative, in the event of his death, in respect of his profit-sharing fund; but in the event of no nomination being made, or no provision for legal representation otherwise taken, the money will, on the production of the certificate of death, be paid to the next-of-kin of the deceased workman. The funds are to be under the management of a Committee of Management, to consist of the Chairman of the Board of Directors, nine members elected by the Board, and an equal number chosen by the employees; and they are to appoint a Secretary. The remaining rules provide for the settlement of differences, the keeping of the books, and the auditing of the accounts. No alteration is to be made in the rules without the sanction of the Committee, and subject to one calendar month's notice.

In connection with this scheme, reference has frequently been made to the "nest-egg." This stands in a different position to the ordinary bonus. It is a gift by the Company to those workmen who were in the service before June 30, 1889, and is to be subject to certain special regulations until June 30, 1894, when all distinctions will cease. In the meantime the following regulations are to apply to the "nest-egg": All workmen who were in the Company's regular employ on June 30, 1889, who signed agreements before Dec. 31, 1889, have placed to their credit a sum of money equal to the amount to which they would have been entitled if the bonus scheme had been started from June 30, 1886. This gives each regular workman who signed an agreement prior to Dec. 31, 1889, 2 per cent. on his wages for the year ending June 30, 1887, 3 per cent. for the year 1888, and 4 per cent. for the year 1889—equal to 9 per cent. on one year. This has been placed to each man's credit, and is to be left in the hands of the Company for five years from July 1, 1889, and will accumulate at compound interest at the rate of 4 per cent. per annum. After June 30, 1894, the "nest egg," with interest, will be subject to the rules applying to the bonus;

it may be withdrawn or remain with the Company at 4 per cent. interest. Any workman who is placed on the superannuation fund may, after June 30, 1890, if he so desires, draw out the money, with interest thereon, or it may remain with the Company at 4 per cent. After that date any workman who leaves the service of the Company in a legal manner may draw out the "nest egg," together with any interest that may have accrued thereon.

In the few preliminary remarks which precede the rules, the Directors state that the one object they had in view in starting the profit-sharing scheme was to induce all their employees to take a real interest in their work, and to give them a new motive for endeavouring to promote the prosperity of the Company. They believe it will have this effect; and they are reluctant to speak of its possible failure. But should hereafter the bonus system unfortunately not succeed in attaching their employees to the Company's interests, and lead to intelligent and good work on their part, the Board reserve to themselves the power to terminate it on giving not less than six months' notice, to expire on June 30 in any year; and no bonus in addition to ordinary wages will thereafter be allowed. The bonus which for the past three years has been given to the officers of the Company is abolished; and in its place the profit-sharing system is in future to apply to officers and workmen alike.

In a circular-letter recently addressed by Mr. George Livesey to the workmen, he offered a few remarks on the profit-sharing scheme, and urged upon the men the advisability of saving money. He called their attention to the statement in the book of rules that "one object the Directors had in view was to induce all their employees to take a real interest in their work, and to give them a new motive for endeavouring to promote the prosperity of the Company." But they had, he said, another object equally important, and that was to promote the prosperity of their employees by giving them an opportunity of making provision for the future. He assured them that every man was perfectly free to withdraw his bonus each year, if he thought fit; but at the same time he demonstrated the advantage to be gained by leaving it with the Company, or saving it in their own way. He admitted the difficulty working men have in saving; but he said he knew, from an intimate acquaintance with them extending over half a century, how much it is for their own good, and that of their families, that they should do so. He asked them as a friend to seriously consider the question, and take the opinion of their wives as to which course it would be best to follow—to draw the bonus or leave it with the Company as an investment. With the view of emphasizing his remarks on the advisability of saving, Mr. Livesey gave three tables showing what annual bonuses of £3, £4, and £5 would come to, with interest, in periods of 5, 10, 20, and 25 years from now. Taking first the £3 bonus, it would amount in 5 years to £19 18s.; in 10 years, to £40 9s. 2d.; in 20 years, to £95 18s.; and in 25 years, to £132 18s. 7d. The £4 bonus worked out as follows; 5 years, £26 10s. 8d.; 10 years, £53 18s. 11d.; 20 years, £127 17s. 4d.; 25 years, £177 4s. 9d. The £5 bonus: 5 years, £33 3s. 4d.; 10 years, £67 8s. 7d.; 20 years, £159 16s. 8d.; 25 years, £221 10s. 11d. The £4 and £5 bonus included the bonuses just declared. Putting the matter in another way, he showed that the £3 bonus would make £20 in five years, the £4 bonus would make it in less than four years, and the £5 bonus in less than three years; or the £3 bonus would make £100 in 21 years, the £4 bonus would do it in 17 years, and the £5 bonus in 14 years from the present time. Those men, however, who have the nest-egg have two or three years' start, and are already well on the way to the £40. Mr. Livesey said he had heard that some of the men were drawing out their bonus because they did not feel quite sure that it was their own property unless they took the money. In reply to this he advised them to read the rules, particularly Rule 5, by which they would see that their bonus was perfectly safe if left with the Company—just as much theirs, and at their disposal at any time, as money in the Post Office Savings Bank. He thought the events of the past twelve months proved that the Company were worthy of the confidence of their employees. Another strange reason given for drawing the bonus was that some men said if they left it in, and thus showed the Company's officers what they could save, their wages would be reduced. In reply to this, Mr. Livesey assured them that a greater mistake could not be made. Those men who were careful with their own money were likely to be careful of the Company's property. The fact of being able to save was a proof of trustworthiness, and made the Directors think more highly of such men, and more anxious to retain them in their service. A number of men at various times had, to their knowledge, saved part of their wages. During more than 50 years, no man had ever had his wages reduced because he saved part of them; on the contrary, when a man had been required for a position of trust, the fact that he was a saving man had been to his advantage. Mr. Livesey closed his letter as follows: "I ask you to believe that, in addressing these remarks to you, I wish to help you to improve your position. As Chairman of the Company, I say you are perfectly free to do what you like with your bonus; but as a friend I say to all, and especially to young men, save it, if possible, and thus lay the foundation of a fund that will certainly be of great advantage to you both in the present and the future."

Last Saturday, a mass meeting of the Company's workmen was held on the Cricket Ground at the Old Kent Road station, to consider the bonus scheme. Tents were erected, in which refreshments were provided; and there was a lavish display of triumphal arches, flags, and Chinese lanterns. The Chairman (Mr. G. Livesey), Mr. Simpson Rostron (one of the Directors), and the chief officers of the Company attended on, invitation; and their reception was of the very heartiest description.

Before the arrival of the above party, a preliminary meeting of the workmen was held, at which the chair was taken by Mr. Burrows. This meeting was addressed by Mr. Roberts and Mr. Spinks (Bankside); Mr. Gilbert and Mr. Austin (East Grenwich); and Mr. Coope; as well as by the Chairman (Mr. Burrows) and others. All the speakers advised those present to leave the bonus with the Company, at 4 per cent. interest, rather than place it in the Post Office Savings Bank at 2½ per cent. Mr. Spinks, in the course of his speech, remarked that he should like to have seen this scheme introduced many years ago, as he would by this time have been a shareholder in the Company. At this preliminary meeting, the following resolution was put and carried with great applause: "We, the employees of the South Metropolitan Gas Company, unanimously desire to present our most hearty thanks to the Chairman and Directors of the Company for the very liberal and satisfactory way in which they have conceded the whole of the profit-sharing scheme. We also desire to thank them for the very courteous manner in which they have received us on all occasions; and hope that the friendship that now exists may long continue—adding to the prosperity both of the Company and its employees. We wish long life to your honourable Board."

Mr. G. Livesey, whose rising was the signal for great applause, said he was extremely glad to see so many ladies—for the question before them was quite as much a wife's as a husband's question. He regretted that most of the Directors were unable to attend, several being away from England; so that Mr. Rostron and himself were the only two who could come. A meeting of this kind was an entirely new thing; and the most satisfactory feature about it was that it was the men's own action entirely. No official on the part of the Company had promoted the meeting in any way. Now, the great hope for the country lay in the creation of a real bond of union between employers and employed. He did not like the separation into classes and masses. What was wanted was that all classes should be united and anxious to benefit the whole body. One of the greatest difficulties was to create a feeling of confidence. Many of those present were new hands, and had been afraid they might be deserted by the Directors, owing to the pressure that was brought to bear upon them. But nothing could have induced them to do this. He had said: "The gas in the South of London shall go out before we do such a gross act of injustice as that." He had also said, with a smile on his face: "But the gas will not go out. We know we can depend on the men who are helping us; and we want to let them feel that they can depend upon us." They had felt for a long time that the great thing workmen had to do was to practise thrift. It was by thrift alone that they could raise themselves in the social scale. The profit-sharing scheme had two objects—one being to create a community of interests. It had been said, by way of reproach: "The consumer gets the advantage of a lower price, and the shareholder then gets a higher dividend; but the working man gets nothing." This they had remedied. Shortly after the strike it was said at a meeting of gas workers at Plymouth: "The profit-sharing scheme is dead." (Laughter.) Why, the "nest-egg" standing in the names of those who were in the Company's employ previous to June last year amounted to £6722; to which must now be added the year's interest at 4 per cent., making £264 more. Then the bonus of last year amounted to £5821, which had been credited to the men who had signed the agreement. Of this, £2641 had been withdrawn. Now, the men were perfectly free to withdraw the money—as free as if it were in the Post Office Savings Bank; and no one had a right to ask them why they withdrew it. Still he might say a word on this subject. One of the chief objects of the profit-sharing scheme was to enable the working men to put by something against the future; and if they drew it out this great object would not be attained unless they employed the money usefully. He did not wish any of them to suppose for a moment that the man who had money with the Company would be thought the worse of on this account. They would rather think the better of him. They would think that the man who took care of his own money would take care of the Company's property also; and therefore, instead of working to his detriment, this would be to his credit. No man was forced to sign the agreement. The agreements were made as easy as possible for the men. They bound the Company to provide the men with work for twelve months, if they conducted themselves properly, but left the men free, if they could find a better job, or wished to improve their position, to leave at a week's notice. Any man could, if he liked, say: "I refuse to sign your agreement;" and he would remain in the Company's service just as if he had signed it—only he could not have the bonus. [A Voice: More fool him.] The difficulty was not that they had to induce men to sign, but that more wanted to sign than they could find work for. As to the future, he would tell them they must be prepared for the bitter as well as for the sweet. Working expenses were very heavy, and the price of coal was nearly double what it was twelve months ago. The shareholders had had to suffer a considerable reduction of dividend, for the strike had cost £80,000. Then they had done a great many things this year that they need not have done, simply for the purpose of giving employment—first of all to the new men, and then to as many of the old hands as they could. So it was possible they might have to raise the price; and then the consumers would suffer, the shareholders would suffer, and the men would suffer. But they would all be in the same boat. However, they must not be disheartened. The tide would take a turn; and he believed it would not be many years before they would be selling gas at 2s. per 1000 cubic feet. Then, instead of 5, they would have 8 per cent. Their profit-sharing scheme had proved abundantly successful. It had created a feeling of unity, confidence, and goodwill between the employers and employed, the like of which he scarcely believed existed in any other concern in London. He felt most grateful to the Committee of the Workmen for bringing them together. He thanked them most heartily for this expression of their confidence; and having attended this grand meeting, received the resolution they had passed, and seen the hearty way with which they had listened to what he had to say, they joined hands, so to speak, with them to all heartily endeavour to promote the welfare and prosperity of the Company.

Mr. Simpson Rostron, Mr. Frank Livesey (Chief Engineer), Mr. Frank Bush (Secretary), Mr. Sims, Mr. Howard, Mr. Tysoe, Mr. C. C. Carpenter, and other officials, having addressed the meeting,

Mr. Butcher moved, and Mr. Johnson seconded, a vote of thanks to the Chairman, the Directors, and the chief officers, for the pleasure they had given them in coming there at their invitation.

Mr. G. Livesey then moved a cordial vote of thanks to the Committee who had had the organizing of the demonstration.

Mr. Rostron seconded the motion.

At the close of the speeches, the company, numbering upwards of 1000, devoted themselves to various kinds of amusements.

DEVONPORT GAS COMPANY.

The Annual Meeting of this Company was held last Tuesday. The report presented to the shareholders stated that notwithstanding the large advance in the price of coals, and the additional cost of labour consequent on the adoption of the eight-hour system in the retort-house, the Directors, by the exercise of a vigilant economy, were enabled to recommend the payment of the usual dividends without encroaching on the balance to the credit of the revenue account, or touching the reserve fund. The gross revenue for the past financial year amounted to £24,133, which, compared with the previous year, showed an increase of £1339. The gas and meter rental came to £19,017, as compared with £18,312. Residuals returned £5107—an improvement of £632. The gross expenditure for coal, wear and tear, salaries, wages, rent, and other incidental expenses amounted to £19,720, against £18,312 the previous year, an increase of £1934. The balance of profit and loss carried to the net revenue account was £4413, compared with £5008. After payment of the usual dividends authorized at the last general meeting, there remained a disposable sum of £6432, from which the Directors recommended the payment of the statutory dividends of 10 per cent. on the original and 6 per cent. on the guaranteed shares, free of income-tax, carrying forward the balance to the next account. The Chairman (Mr. R. C. Smith), in moving the adoption of the report, referred to the recent rise in the price of coal, and informed the shareholders that, fortunately, the Directors made their coal contract in time to enable them to pull through the year better than many other gas companies had done. Almost all gas companies, he said, had felt it necessary to advance the price of gas—some from 15 to 25 per cent.—but the Board had not done so, and their present intention was to maintain the *status quo* in this respect. The adoption of the eight-hour shift for the stokers had involved an increase of 33 per cent. in the wages account. Through the labour troubles of the past year, the Company's staff had worked on very steadily, and with very good feeling; and he hoped they would continue in the same way. There was an increase of about 4 per cent. in the gas-rental, and a satisfactory advance in the returns from residuals, as compared with the previous year—the improvement on the revenue account amounting to £1339. This, however, was more than absorbed by the extra expenditure on coal and wages, which had respectively cost £1600 and £341 more than last year. The balance of profit and loss carried to the net revenue account was £4413, as compared with £5008 last year—a difference of about £600. The coming year would, he was afraid, show a very much more serious difference, in consequence of the higher price of coal, and the additional cost of wages. He did not, however, despair; and hoped that—with good management—they would be able to pull through without raising the price of gas. Before concluding, the Chairman said that the Manager (Mr. R. Clarke) had been devoting his attention to new inventions for the carbonization of coal and the purification of gas. These experiments were of a tentative character; but the Directors hoped that they would be productive of considerable benefit to the Company and also to the consumers. Mr. White seconded the motion, and the report was adopted unanimously. A motion authorizing the payment of a dividend of 10 per cent. on the original, and 6 per cent. on the guaranteed shares, was also carried. The Chairman, who was one of the retiring Directors, in acknowledging his re-election, said it was thirty years since he was elected to the chair. At that period, they made about 50 million cubic feet of gas per annum; and it was now 160 millions.

ATHERTON LOCAL BOARD GAS SUPPLY.

Large Reduction in Price.

The accounts of the Atherton Local Board for 1889-90 show the average net price received for gas per 1000 cubic feet to be 34·7d., and the cost of production 14·14d.; or including loan redemption and interest, 27·04d. The net profit is therefore 7·66d. per 1000 cubic feet sold, amounting to £825. In the previous year the net profit was 3·43d.; the average selling price being only slightly different (34·83). There is thus an increased profit of 4·25d. per 1000 cubic feet, although the cost of coal and cannel has been 13·25d. per ton higher. This result is due to the following causes: (1) A reduction in the unaccounted-for gas from 10·36 to 7·4 per cent. (2) A large increase in the consumption of gas—viz., 13·36 per cent. (This reduces the cost per 1000 cubic feet in the fixed charges.) (3) The larger production and higher prices of residuals; the production being increased by the improved appliances adopted during the year. Owing to these causes, the working expenses are rather less than in the previous year, although the higher-priced coal added 1·25d. per 1000 cubic feet, and there was an advance of wages during the year; the difference being made up by a saving of 0·86d. in repairs (those in the previous year being about this amount above the average), and other current expenses. From the same causes, loan repayment and interest cost 1·7d. per 1000 cubic feet less, while the value of residuals produced increased from 5·6d. to 8·09d., or 2·43d. per 1000 cubic feet. On consideration of these circumstances, the Gas Committee decided to recommend a reduction of 5d. per 1000 cubic feet, which reduces the price of gas to a figure as low as can be found anywhere in a works producing less than 30 millions per annum. The price will still leave a profit of nearly 3d. per 1000 cubic feet; but there is a further advance in the cost of coal, which will add about 2·5d. per 1000 feet to the cost of production. There is also the outlay in extensions of the works to consider, as they will involve an addition of about £300 a year in the redemption of loan and interest when all is completed. It is expected that if the present prices of residuals are maintained, there will be a further improvement of 1·5d. per 1000 feet in that item, through the larger production which it is now proved can be obtained by the extension of the generator system of retort firing. The increased sale of gas, which may again be expected to reach 10 per cent., will add a further saving of 1d. per 1000 feet in the fixed charge if it is realized. On this estimate it seems likely that the present year's accounts will show a surplus of about 2d. per 1000 feet; and in order to encourage the consumption of gas as much as possible, it is thought advisable to make the reduction for the present year at least. The works are under the management of Mr. Daniel Schofield as Secretary, with Mr. Sheard as Works Manager. Mr. T. Newbigging, C.E., is the Consulting Engineer.

SOME NOTES FROM LEEDS.

From A Correspondent.

LEEDS, *Saturday*.

The members of the Gas Sub-Committee are still groaning under the public charge of gross mismanagement. During my perambulation of the town this week, I hear on all sides: "Not a man will get re-elected." Of course, the defence of the Sub-Committee at the recent meeting of the Leeds Corporation was a good one—that they had done their best. But I am sorry to say that the Leeds public do not think so. At any rate, the local press, whether Liberal or Conservative, have taken sides, right through the struggle, with the men. Last Thursday, I visited the famous Meadow Lane—the field of battle. It had been previously explained to me by a Leeds Gas Engineer that the Chief Constable was by no means a military tactician, or he would not have given the points of vantage to the enemy. The entrance to Meadow Lane yard lies between two railway bridges, one of which is that belonging to Holbeck station. The plan of action was to keep the road clear between the bridges, to allow the new men to march into the works from the Holbeck station. If the men had not been taken on to the next station, and then locked up in the Leeds Town Hall, no one would have been the wiser. But it having been rumoured that the new men were to be detrained, of course the enemy (the strikers) made their plans accordingly. Thus it was that the railway bridge was occupied; and when the Leeds police and military came in sight, the lumps of coal, sleepers, stones, &c., were hurled from the fortress with good effect. I may say that to-day I saw a piece of stone, quite 10 inches square, still lying on the roadside. So the missiles were of no slight dimensions. Visiting the gas-works, there was much disconsolation on the faces of the officials, although they had nothing whatever to do with the police protection. One officer owned freely that the famous "Charge of the Light Brigade" was not to be compared with it for blundering. However, I am glad to say that everything has now settled down to quietness and order.

While Leeds has "beaten the record" for mismanagement, it is yet likely to hold its own—if not to take a lead—in the gas industry. I visited the Leeds Forge on Wednesday, and, by the kindness of the Manager, the secrets (if there are any) of the manufacture of water gas were revealed to me. There is no denying the fact that the British Water Gas Syndicate is going ahead. Next Monday two more generators are to commence—thus making four in operation. I saw 200 yards of 18-inch gas-main laid down to several new steel furnaces, and these will start work also. As to the making of gas in the short space of 15 minutes from mere coke, I witnessed the gasholder rise perceptibly with an extra 5000 cubic feet of gas. This was accomplished by two men and a lad, which at the same rate meant 20,000 cubic feet per hour. The four generators will, it is estimated, be worked by six men. There are now six boilers heated, besides the blast to the various furnaces, and the illumination of the Leeds Forge works. I was informed that at the time I was present, a carburetter was under test, and that there is every prospect of its success; so that, if accomplished, the illuminating difficulty will be at an end. The British Water Gas Syndicate have just completed a plant at Messrs. J. Spencer and Son's engineering works at Newburn. From inquiries I have made, I learn that the Syndicate are not to have it altogether their own way. It is said that the Von Langer Water Gas Company (to whose process reference was made in the JOURNAL a few weeks ago), of 32, Park Row, Leeds, are to be in the field very shortly; so that the Water Gas Syndicate must not lose time.

The Leeds Exhibition is going on very slowly, although the management own to a great improvement since they started in May. The gas industry is very well represented here, and really their efforts should have greater patronage. In the way of gas-engines, there is the famous "Stockport," driving numerous dynamos. Mr. Woodhead has the "Leeds" gas-engine fixed to advantage; so also has Mr. Steel, of Water Lane, who was in trouble with Messrs. Crossley Bros. some time ago for infringement. In the gas-stove line there are numerous exhibits. Messrs. Galli and Co. show their well-known kitchener and their patent baker's oven. This last one is quite new, and is worthy the attention of the trade. In this invention there are really two ovens—one above the other; the gas being in a cavity between the two. By means of a flue, the heat travels completely round it. After the gas had been lit at the time of my visit, the lower oven registered 350° and the top one 600°. I am bound to say that a better equalization would be of greater value. However, Mr. Galli's invention is worthy of compliment. Not far away I inspected another baking oven, called the "Yorkshireman." This was built tier above tier—as high and with as many ovens as you please. The gas radiated outside the ovens; and a uniformity of heat is claimed, although I was unable to test it. Undoubtedly for bakers, confectioners, hotels, &c., it would be a desideratum. Mr. W. Towler, of the Globe Foundry, Leeds, is the gentleman responsible for this branch of industry. Messrs. Arden Hill and Co., of Birmingham, make a capital show of cooking and heating stoves, several new things being introduced. Of course, Messrs. Stott and Co.'s and Messrs. Shaw's gas-governors are on view; and many manufacturers of steam machinery are exhibitors.

Bursting of a Water-Main at Gloucester.—Early on Monday morning of last week, the city of Gloucester lost about 400,000 gallons of water by the bursting of an 8-inch water-main in Barton Street, opposite the public baths now in course of erection. The water leaked into the baths; and when these had been thus prematurely filled, it flowed over the roadway, and into some of the cellars in the vicinity, thus leading to the discovery of the accident. The valves were at once turned off, and the flow stopped. This loss of water is a serious matter for the city, as (notwithstanding the recent heavy rains) there was none too much in the reservoirs. The daily consumption of the city is about 600,000 gallons.

THE PROPOSED CONSOLIDATION OF GAS AND ELECTRIC LIGHT UNDERTAKINGS IN MASSACHUSETTS.

A short time ago a Bill was promoted in the Massachusetts State Legislature to authorize the consolidation of gas and electric light companies. The object of the Bill was primarily to sanction the amalgamation of the various Boston Companies now controlled by the Bay State Gas Company, with an authorized capital of $21,250,000, of which, it was asserted, $14,390,000 would be "water." The proposals contained in the measure excited considerable opposition; and although the Bill was passed by the Senate to be enacted, the Governor (the Hon. John Q. A. Brackett) vetoed it when it was submitted to him in the usual course for signature. This veto was subsequently sustained by the Senate by 34 votes to 3. The consolidation of gas and electric light undertakings is by no means an unusual proceeding in America; and therefore it may be of interest to indicate the Governor's reasons for objecting to the proposal relating to his particular State. This we are able to do from the report he presented to the Senate.

After stating that the object of the Bill was to allow the consolidation of both gas and electric companies, and of two or more gas companies or two or more electric companies in the same city or town, the Governor pointed out that the union of a gas company with one or more electric light companies could now be practically effected under the provisions of cap. 385 of the Acts of 1887. This had already been done in many towns and cities; the gas company (when authorized by the Board of Gas and Electric Light Commissioners to engage in the business of furnishing electricity) having the right to purchase or lease the electric property and franchises then in use in its territory. If the consolidation of gas and electric light companies was to be authorized by a general law, the exercise of this authority, in every case, should be made subject to the approval of some competent tribunal, whose duty it should be to consider the effect of the proposed consolidation upon the interests of the public. A union of companies in one town or city might be for the advantage of the people, but have the reverse effect in another; and the question as to whether it should take place should not be left to the determination alone of the stockholders of the consolidating companies, who would naturally make their own interests paramount to those of the public. No such safeguard was provided by the Bill. While it appeared to give the Board of Gas and Electric Light Commissioners some supervision, it gave that Board no authority to pass judgment upon the expediency of the consolidation. The advisability of a union of companies in any town or city presented a question which the Board ought to be peculiarly qualified to consider and determine; and the authority so to do should, in the Governor's opinion, be given to it if the Bill was to be enacted.

The Governor next proceeded to show that it was obvious that the Bill, if it became law, would make a radical change in the existing policy of the Commonwealth in relation to the capital stock of gas and electric light companies, the manner in which it might be increased, and the way in which the shares should be issued and paid for. The Bill was a wide departure from the principles upon which these statutes were based; and as it provided that all Acts and parts of Acts inconsistent with it were to be repealed, it was a question whether its enactment would not repeal them. He then went on to specify his principal objections to the Bill, as follows: "My chief objections relate to the restrictions in regard to the amount of stock which may be issued by the new Company. These, in my opinion, are wholly inadequate. There are two limitations: (1) The capital 'shall not exceed by more than 25 per cent. the aggregate capital stock of the constituent Companies authorized at the time of consolidation;' (2) it shall not exceed 'the fair cash valuation of the shares of the constituent Companies issued and outstanding at the time of consolidation, as estimated by the Tax Commissioner for the purposes of taxation on the 1st day of May next preceding such consolidation.'" He pointed out that the first limit practically placed no bar to the most reckless issue of stock. It not only permitted it, but seemed to invite it. The Bill allowed a further increase of 25 per cent. over the amounts usually authorized, and did not require any additional money representing the extra capital stock to be paid into the treasury for the use of the new Corporation. The inflation possible within the meaning of the clause "authorized at the time of consolidation," he thought might be illustrated by the case of Boston; and he gave the following figures for that city:—

Gas companies' authorized capital		$12,000,000
Electric light companies' authorized capital		5,000,000
Total authorized capital		$17,000,000
Add 25 per cent.		4,250,000
Total authorized capital under the limitation		$21,250,000
Gas companies' present capital	$5,360,000	
Electric light companies' present capital	1,500,000	
Total		6,860,000
Possible increase by the Act over present capital		$14,390,000

These figures, although large, did not, the Governor pointed out, represent the full extent of the inflation possible under this limitation. They only represented the amount in the event of all the Companies being consolidated at the same time. This need not be done, however. Two of them might unite; and the new Company formed by this union afterwards unite with a third, and so on. Upon the first consolidation the authorized capital of the new Company would be the aggregate of the capitals of the consolidated Companies, with 25 per cent. thereof added. When the new Company came to unite with the third Company, this authorized capital would be added to that of the third; and the amount might be further increased by the addition of 25 per cent. In other words, at each consolidation, 25 per cent. of the sum of the authorized capitals of the combining Companies might be added; so that when all were finally united the increase of the capital of the consolidated Company over the present actual capitals of the Companies named might be far in excess of the $14,390,000. The Governor thought there was no doubt that the intention to proceed in this way would be disclaimed by the parties interested in the Bill; but he considered that in enacting, it was important to consider possibilities as well as present intentions.

With regard to the second limit, this was scarcely less objectionable in the Governor's opinion than the first. The valuation of the shares by the Tax Commissioner for the purposes of taxation ought not, he thought, to form the basis of the capital stock. By cap. 13 of the Public Statutes, it was provided that the Tax Commissioner should ascertain, from the returns or otherwise, the true market value of the shares, and should estimate therefrom the fair cash valuation of all of these shares on the 1st day of May next preceding, which should be taken as the true value of the corporate franchise for the purposes of the chapter. He considered that the basis for the issue of stock should be uniform among the companies and should be fixed, as far as possible, by the necessary outlay in the acquisition of real and tenable property. Companies which combine ought not in this respect to have an advantage over those which remain separate. The market value of the shares fluctuates. Accidents and unavoidable casualties may for a time depress it. At other times an over-estimate of future business, or a too sanguine expectation of increased gains from a new invention or some novel process of manufacture may advance the price in stocks far beyond their intrinsic worth. Sometimes the accumulation of a surplus causes a rise in the market value of stocks.

The Governor then passed on to deal with the questions of reserve funds and dividends. He called the attention of the Senate to the fact that the published balance-sheets of the companies in the State, more especially the gas companies, showed that many of them had a substantial reserve fund in some form. As this surplus was gathered from the money collected from the sale of gas or electricity, and came from the pockets of the consumers, it should, in his opinion, be kept reasonably small. This result could always be reached by a reduction in the price charged for light. Whenever a considerable balance had been saved from the ordinary receipts of a company, it was safe to assume that the stockholders had meanwhile received adequate dividends. In such a case it might fairly be said that the stockholders and the consumers had a mutual interest in the surplus. These companies were substantially public corporations. Light being a necessity in dwellings and in streets, it should be supplied at the lowest price that would yield a fair return upon the capital invested. There should be no unnecessary stock-claiming dividends. The amount of capital employed in the enterprise should be kept on a proper basis. This had been fixed by the existing laws, which required that the capital stock of a corporation should be paid in, either in cash or its equivalent, before it commenced business, and which prohibited the issue of new stock by a gas company unless the par value of the shares was first paid in cash. To authorize the issue of such new stock without such payment was to authorize what was popularly known as "stock watering." It did not increase the capacity of the concern for enlarging or improving its service, because nothing was added to the Treasury. It gave to those who were so fortunate as to receive the additional stock, property for which they had not paid, and upon which they expected to receive dividends. These additional dividends were to come from the pockets of the people. The burdens of the many were made heavier in order to swell the profits of the few. This, it seemed to the Governor, would be the effect of the Bill under consideration. He then proceeded to show how injustice had been done to the gas consumers of New York by the carrying out of a scheme of consolidation very similar to that proposed in the Bill on which he was reporting. In the State of New York the law formerly provided that, where two or more corporations consolidated, the capital stock of the new company should not exceed the aggregate amount of the capital of the consolidated companies. In 1884 this law was changed so as to allow the capital of the new company to equal in amount the fair aggregate value of the property, franchises, and rights of the consolidated companies. Under this statute, the Gas Companies of the City of New York consolidated. The New York Gas Company, in entering the consolidation, raised its capital stock from $4,000,000 to $7,560,000; the Manhattan Company, from $4,000,000 to $11,940,000; and the Metropolitan Company, from $2,500,000 to $6,500,000. The other Companies did the same; so that their aggregate capital, which before consolidation amounted to $17,000,000, was increased by it to $39,078,000, or more than 100 per cent. The result was that the people of New York City were obliged to pay dividends upon more than double the capital stock upon which they had previously paid. The Committee appointed to investigate this matter by the New York Senate in 1886, in their report said: "If injustice has been done to the gas consumers of New York City, it has been done by the Legislature in passing a law allowing consolidation to be effected in this manner." Believing that the Bill which had been submitted to him was one which, if passed, might lead to a similar charge of injustice to the gas consumers of Massachusetts, the Governor felt that he must withhold his sanction to it, inasmuch as it gave, without proper safeguards, to corporations already enjoying great privileges, additional powers, which, however profitable they might be to their stockholders, would be detrimental to the interests of the people. He therefore returned the Bill for the reconsideration of the Senate—with the result that, as already stated, the veto was supported by a practically unanimous House.

The Edison and Swan United Electric Lighting Company, Limited.—The report of the Directors of this Company for the year ended June 30 last shows a credit balance of £61,115, of which £12,371 has been absorbed by the payment of an interim dividend on the "A" shares at the rate of 7 per cent. per annum for the first six months of the year. The Board recommend the following dividends on the "A" shares, free of income-tax: At the rate of 7 per cent. per annum for the half year ended June 30, (making 7 per cent. for the year), 4 per cent. in completion of the payment of arrears of cumulative preference dividend for the year ended June 30, 1884, and 4 per cent. in respect of arrears of cumulative preference dividend for the year ended June 30, 1885, leaving £8093 to be carried to the reserve fund.

METROPOLIS WATER SUPPLY.

The Quality of Water during the Month of June.

The returns furnished to the Registrar-General by the London Water Companies as to the water supply of the Metropolis during the past month, show that the average daily supply was 185,376,080 gallons; being at the rate of 31·2 gallons per head of the population, as compared with 30·8 gallons in June, 1889. Of the entire bulk of water sent out, 92,923,757 gallons were drawn from the Thames, and 92,452,323 gallons from the Lea and other sources. Reporting upon the quality of the supply, Dr. E. Frankland said: "Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies, and by the Tottenham Local Board of Health, was: Kent, 0·3; New River, 0·7; Tottenham, 1·1; Colne Valley, 1·2; East London, 1·4; Grand Junction, 1·8; Chelsea, 1·9; Southwark, 2; West Middlesex, 2·1; and Lambeth, 2·6. The water drawn from the Thames by the Chelsea, West Middlesex, Southwark, Grand Junction, and Lambeth Companies was in every case efficiently filtered; and the improved quality which it has of late exhibited has been fully maintained. The water obtained chiefly from the River Lea by the New River and East London Companies was also efficiently filtered, and exhibited a high degree of organic purity; the New River Company's supply being again especially distinguished in this respect. The deep well waters of the Kent and Colne Valley Companies and of the Tottenham Local Board were, as usual, of great organic purity; that delivered by the Kent Company contained only mere traces of organic matter. These waters were clear and bright without filtration."

Messrs. Crookes, Odling, and Tidy, in the course of their report to the Official Water Examiner (General A. de Courcy Scott), on the quality of the daily samples of water supplied in London during June say; "The character of the water supply to the Metropolis during the month of June has not exhibited any features calling for special remark. As usual, the proportion of organic matter—inconsiderable, save on exceptional occasions, even at its highest—is somewhat higher in the case of the Thames-derived water than in the case of that derived wholly or in large part from the Lea. Taking the water furnished by the Companies deriving their supply from the Thames for comparison, the mean proportion of organic carbon was found to be 0·150 part in 100,000 parts of the water, with a maximum of 0·166 part in any single sample examined. During the past six months of the year, we have examined a total of 1445 samples of the Metropolitan water supply. Speaking generally, the water has been characterized, to a more than usually noticeable degree, by its uniformity of composition from month to month. Thus, taking the Thames-derived samples for comparison, the mean proportion of organic carbon for the six months' period was found to be 0·150 part in 100,000 parts of the water, or identical with the mean proportion for the present month; while in five samples only was the proportion found to reach or exceed 0·170 part—the maximum in any single sample examined being 0·174 part in 100,000 parts of the water. Similar conclusions are afforded generally by a comparison of the numbers expressing the amounts of oxygen consumed, and degrees of freedom from colour-tint of the successive monthly supplies. It is to be noted, however, that while the curves representing the variations noted by the three several methods of examination show a marked correspondence when the variations are, relatively speaking, at all considerable, their correspondence, as might be expected, is of less strict or more general character only in the case of such inconsiderable variations as have alone had to be recorded during the past six months."

A Large Electric Light Scheme.—It is reported that a concession has been granted to a civil engineer and a firm of bankers in Dresden, authorizing them to establish a network of cables for the transmission of power and electric lighting direct from some coal mines through 168 industrial towns in Saxony to Dresden.

Opposition to Electric Lighting Poles and Wires at Fareham.—The owners and ratepayers of Fareham are determined if possible to prevent the erection of electric lighting poles and overhead wires in the district. The former are regarded by them as being very "unsightly," and the latter "dangerous." A protest which, it is hoped, will be extensively signed, will shortly be forwarded to the Local Board.

Accidents with Paraffin Lamps.—On Sunday morning of last week, a married woman named Nancy Parker, 62 years of age, was admitted to the Leeds Infirmary, suffering from severe burns, which were caused by the explosion of an oil-lamp. The injuries she sustained proved fatal during the day. The same morning, at Birmingham, Mary Bradley (aged 53), a married woman, while carrying a paraffin lamp upstairs, stumbled. The lamp was shattered; and the poor woman was quickly enveloped in flames. She was taken to the General Hospital, where it was found that she was badly burnt about the arms and legs.

The Mersey Aqueduct for the Vyrnwy Water Supply.—At the meeting of the Liverpool Corporation Water Committee yesterday week, Mr. Holme said that, in his opinion, it would be better if at the meetings of the Committee the Engineer's report as to the Mersey crossing in connection with the Vyrnwy water supply was read in public. This was a matter in which a great deal of interest was taken; and it was well that the ratepayers should know how the work was progressing. Since Messrs. Monk and Newell had given up the contract absolutely nothing had been done, excepting the shafting. In this case the work was a matter of much importance to the public, as two millions of money was lying waiting the construction of the aqueduct, before Liverpool could get water. The Chairman (Dr. N. Marsh) thought that Mr. Holme was representing the matter as worse than it really was. The machinery necessary for the work was in position; and the contractors were only waiting for the castings. Mr. Holme, after some further conversation on the subject, moved that the Engineer's report be read before the press representatives retired. No one seconding the motion, the matter dropped.

THE WATER SUPPLY OF THE CITY OF LONDON.

The Inquiry by the Corporation Committee.

The inquiry instituted by the Corporation of London into the question of the water supply of the City (*ante*, p. 105) was continued on the 3rd inst., under the presidency of Sir GUYER HUNTER, K.C.M.G.

Mr. *Allen Stoneham*, the Official Auditor, under the Metropolis Water Act, 1871, was the first witness. He said the capital raised by the eight London Water Companies up to March 31, 1890, was £14,838,177; the expenditure up to that date being £14,705,777. The net water-rental was £1,775,038; the amount derived from rents, £14,191 (arising from rents of lands taken from the Companies for various purposes)—making together £1,789,229. The working expenses were £647,407; the gross profits on trading, £1,114,820; interest and preference dividends, less interest received, £175,014; net profit, £939,806; amount disbursed in dividends, £921,905. The New River Company acquired some properties that were protected from audit, so far as certain portions were concerned, by the 47th section of the Metropolis Water Act, 1871. He had no practical cognizance of what these properties yielded, because the accounts were strictly private. The Companies had power to collect their water-rates in anticipation; but what they usually did was to collect them during the half year to which they related. The question of a supply by meter did not come within his duties as Official Auditor; but he had a pretty strong opinion upon it. He believed it would be advantageous generally; but in a district like East London, it would be disadvantageous if the supply was by meter and the landlord paid the rate. Pressure would, no doubt, be brought to bear upon the consumer to use only a small quantity of water, which would lead to a curtailment of its use for sanitary purposes. The application of the meter system would involve a large outlay in the fixing of meters in the houses—it might be from £3 to £5 a house; and this was an important consideration to a small householder. In large buildings one meter would record the supply; but he hardly thought that, in the case of a row of houses, one would be sufficient. Witness then proceeded to explain the scheme of the late Mr. E. J. Smith for the purchase of the undertakings of the Companies. He said that Mr. Smith proposed in the year 1880 to purchase the whole of the water undertakings without the payment of any capital; and he did it by converting what he estimated as their existing water-rentals into 3½ per cent. stock. He proposed to give the Companies an immediate annuity of £773,454. It was afterwards to be increased by unequal increments, extending over twelve years, to £1,098,953. There were also the preference and debenture capital, and loan debts in respect of which dividends and annuities amounting to £141,171 were paid, which he converted in the same way. If this scheme had been carried out, the amount of £1,098,953 would have had to be reduced by four payments, which had not yet become due to the New River Company, an annuity of £9800 payable in 1880, £10,054 payable in 1891, and £10,290 payable in 1892; in addition, £17,500 payable to the East London Company in 1892. Deducting these amounts, which in the aggregate reached the sum of £47,635, from the total £1,098,953, the annuities which would have been payable at the present date, £1,051,318, would have been *plus* the interest then payable, of £141,171. The capital expenditure of the Companies in 1879 was £12,327,682; and their gross profits were £857,909. The capital expenditure up to the latest date had been £14,705,775; and the gross profit up to March last was £1,114,820. With regard to the quinquennial assessments, the Companies were, no doubt, acting within their rights in the matter. He believed that there had been a continuous rise in the assessments since 1840; but he thought the Companies had improved the supply. He had seen it stated that such was not the case; but he thought, in justice to the Companies, it could be said that the quality of the water had been improved. In reply to other questions on this subject, witness stated that he found he paid £14, or £1 per head for the residents in his house on account of the water supply; but if he went to a small house in which there might be ten persons living, he found they paid something like £2 altogether. In Manchester there was a charge of 2s. per 1000 gallons of water consumed; and their scale of charges went up to 3 million gallons (£60 13s.); whereas in the Metropolis the rate was in some cases 9d., and in others 1s. per 1000 gallons.

Mr. *Walter* next gave evidence. He said that some 60 or 70 years ago, he resided with his parents in a public-house in Poppin's Court, Fleet Street. At first they were supplied with water from the Thames Water-Works, then on London Bridge; and he remembered that when the New River Company asked his father to take their water for the future, the inducement was that there would never be any variation in what they then paid. The house was rented and rated at £60 per annum; and they paid for water £1 6s. a year. The water was stored in a tank holding 150 gallons; and they were never able to use it until it had been allowed to settle down. They cleaned mud out of the cistern every three months There were also two other houses, in the same court, rated at about £30 a year each, for which they paid on account of the water supply 10s. each. The houses referred to had long ago been taken down.

Sir *W. J. Farrer*, F.R.G.S., and late High Bailiff of Westminster, traced the history of the Water Companies from a distant period, and mentioned that in 1848 the Lambeth Water-Works Company applied for powers to come under the provisions of the Water-Works Clauses Act, passed in the previous year, in regard to their scale of charges. In 1852 the other Companies, finding that the Lambeth Company had derived great advantage from being under this Act, applied for the same benefits. The question then arose as to the basis on which the water-rate should be calculated. One suggestion was that the basis of assessment should be the annual value of the premises; and that it should be fixed by the Company's officers. This was objected to; but the parochial assessment would not do, nor would the income-tax basis. So annual value was fixed. In the course of further remarks, witness alluded to the enormous increase in the value of property in London, which, he said, commenced in 1854; the difference between the years 1854 and 1860 being considerable. The cause of this was the vast accumulation of population and wealth in London. He had had a great deal to do with the buying of houses in London; and, from personal experience,

these were the years during which the large increase in valuation took place. Referring to the net annual value of a house, he explained that they could only arrive at it by first taking the gross rent, and deducting the rates, taxes, and repairs. After 1880, when the effort to purchase the undertakings of the Water Companies failed under Lord Cross's Bill, the Companies became alive to the powers they possessed, and the facts of the enormous increase that had taken place in annual valuations. He admitted that they were acting quite within their legal rights in respect to the quinquennial valuations; but he thought they were doing so in contravention of the representations they formerly made. With respect to supplying by meter, he said he had not considered the question from this point of view. He thought the water supply of London should be under the control of the municipal authority—not a specially constituted body.

The proceedings were then adjourned till the 11th inst. On the resumption of the inquiry on that day,

Mr. *B. Scott* (the City Chamberlain) was re-examined. He put in a statement respecting the income, profits, and expenses of the Water Companies for last year. He said the gross water-rate was £1,847,021; but from this there should be deducted empty houses and bad debts, which amounted to £118,261. The net income from water-rental was £1,728,760. After deducting miscellaneous expenses, rents of houses, lands, &c., there was a balance of £1,746,510—the gross income. With reference to rents of houses, lands, &c., the amount put down under this head was £13,103. Then there would be expenses of maintenance of works and management, amounting to £513,210; and the management expenses, including salaries of officers, Directors' fees, &c., were £134,631. If these figures were added together, they would amount to £647,841, which, being deducted from the total income, would leave the trading profit at £1,098,669. The dividends paid by the Companies during the year made up to the end of December, 1888, or March, 1889, amounted to £903,682. The water rights paid amounted to £33,028; the rates and taxes (exclusive of income-tax) on their undertakings in different parts near London amounted to £149,503. The following were the sums paid in dividends by the Companies during the period mentioned: East London, £120,487; Kent, £79,066; Lambeth, £124,447; Southwark and Vauxhall, £61,722; Chelsea, £64,523; Grand Junction, £96,750; New River, £241,131; West Middlesex, £115,507.

Mr. *Jabez Hogg*, M.R.C.S., who had been examined on a previous occasion, was also recalled. He said that, since his former evidence was given, he had examined specimens of the water supplied to London, and had found that the statements he had previously made as to the water of the New River Company were true, that the water from the Lea was worse, and that taken from the Roding was worse still. The City of London was in a very bad condition as to its water supply. By taking water up near Ware, he found it was somewhat contaminated both above and below the intake. Such water was dangerous to health. In this water he had been able to get a full crop of bacterial life. In the River Lea the contamination was worse, because a great many sewage farms were allowed to send in their effluent water, and the sewage could almost be smelt. The Roding was so bad in some places that with water taken from parts of it he could write his name on a piece of paper. He had tested the hardness of the New River water by having his boiler cleaned out after six months' use, and half-an-inch of carbonate of lime was found to have been formed inside. This rendered the condition of the boiler dangerous. By using Clark's system, water could be softened 10° at the cost of half-a-farthing per 1000 gallons. This would precipitate all organic matter. Filters would not do it; they only separated the coarser from the finer matter. In speaking of filters, he meant those employed by the Companies; but the same remarks applied to those used for domestic purposes. The latter were even worse; because the accumulation of solid matter was allowed to go on, unless they were often cleaned out. He had taken several samples of water from the Roding, in the neighbourhood of which market gardening went on to a large extent, which would account for the condition of the river. But he did not think any of the Roding water found its way into the Lea, as there was no connection between the two rivers. With regard to the water taken from the Thames, he knew that the surface of land and roads, including manure, &c., was washed into the river. Just below Teddington Lock he had taken out of the river animals that had come up from the sea. As to the possibility of introducing a competing supply, witness said Chilton Ridge—an immense range of hills not far from London, and covering 1500 square miles—held an enormous quantity of water, which now flowed underground into the sea. Any amount of water could be collected there; and if it could be pumped into a reservoir half the height of the hills, it would gravitate to London. It would be delivered in London to the height of (say) the top of St. Paul's. It was suggested some years ago that a constant supply of water could be obtained from the Chilterns at a cost of ten millions sterling which would cover the whole expense. This water it was estimated could be supplied at half the present cost; but when the scheme was brought before Parliament, the opposition to it was so great that it fell through. Questioned with reference to the supply of water by meter for domestic purposes, witness said he thought this could be done if there were two services of water. If a new supply could be obtained from the chalk, this might be sent into the houses for domestic use, and it would be pure and independent of the present supply, the greater portion of which was only fit for watering the streets, putting out fires, flushing sewers, and such-like purposes. If pure water were supplied, he did not think any great objection would be made to the extra cost of the meter. He admitted that two sets of pipes would be required, and that this might possibly enhance the price of the water. The only objection urged against a supply by meter was that the poor would be placed at great disadvantage. But the system was in use for factories, and he did not see why it should not be more generally employed. If water were bought by measure, there could be no dispute.

Alderman *Cowan* followed. Questioned as to the advisability of a supply by meter in poor neighbourhoods, he said he was in favour of having a meter in a particular district, from which the houses could be supplied, so that the cost of the total quantity of water used would be distributed—each occupier paying *pro rata*. The effect of this would be that the poor—the individual householder—would not be stinted in the supply of water. If he had to pay for it, he might be tempted, as had been suggested, to use less; on the other hand, if he was one of a considerable number, he would not economize for the sake of saving his neighbour's pockets. He pointed out, with regard to impure water, that it often became contaminated while in the consumer's hands.

Mr. *G. Webster*, an Australian merchant, gave evidence as to the efforts he was making in the Colne Valley for the supply of pure water. He said he had been most successful in boring; and the water had been described as excellent for domestic purposes. Supposing the works for the conveyance of the water were complete, he was in a position to supply London with 2 gallons of water per head per day, assuming that the Metropolis numbered 5,000,000 people.

On the resumption of the proceedings on the 18th inst.,

The PRESIDENT referred to a rumour afloat, to the effect that the Committee were not disposed to act in concert with the London County Council on the water question; and he took the opportunity of stating that it was their earnest desire to co-operate with that body. It would give the Committee the greatest satisfaction if by such co-operation the inquiry could be made as complete as possible, and brought to a successful conclusion. There were plenty of means to carry on the investigation, and so it did not appear necessary that there should be a separate one conducted by another public body.

Mr. *A. E. Dobbs* was then examined. After referring generally to the method adopted by the London Water Companies in the collection of their accounts, he stated that in one or two cases where a dispute had arisen as to charges for extras, the Companies had sent in no demand at all, while in others they had sent a demand, but did not follow it up with a notice for cutting off. If the consumer made the slightest slip, he was in the power of the Company; while if the Company made a mistake, the consumer was powerless, inasmuch as he had all the fighting to do, with the chance of being beaten. Witness did not blame the Companies for their action, nor did he think they had exceeded the powers placed in their hands by loose hap-hazard legislation. He believed that, under existing circumstances, it would be better for a man to pay a water-rate all his life than fight any of the Companies by himself, because he was helpless. If he took legal advice, it amounted to more than the rate; and this was only an initial proceeding. Witness then handed in some suggestions (which he did not wish to be made public); stating that he believed a Bill drafted on these lines would have a good chance of being fairly considered by Parliament if it was backed by the Corporation, the County Council, and other powerful bodies. He believed further that it would place both the Companies and the public on a fair and equal footing. Questioned as to the suggestion that a Water Trust should be established for the purpose of managing the water supply, witness said the actual administration and the supervision of details should be in the hands of a small body of paid men, who would see to the carrying out of the Act of Parliament which would constitute the new arrangement. This body should be made responsible to (say) the Corporation or the County Council; and it should enjoy the confidence of these bodies, and therefore that of the ratepayers. He thought it was necessary that the executive body should be small. Asked as to the absolute powers of the Water Companies, he said if the construction which the Companies placed upon their Acts was carried out in the strict letter of the law, the consequences that would ensue could never have been contemplated by a Legislature of sane men. Companies like the New River Company claimed that they could charge to the full maximum of the annual value for the domestic use of water in dwelling-houses; and for the business use of water—namely, that which was not used for domestic purposes—they compelled the payment of a separate and extra charge, and they could prevent the use of any water lying in the cisterns. Asked as to whether or not the Water Companies had made charges which were illegal, Mr. Dobbs said he had been urging since 1881 that there should be a collection made of such cases, so that the fact that illegal demands were made could be brought home to the Companies. With regard to a constant or an intermittent supply, he thought in a poor neighbourhood, where there were a number of small houses, where the fittings were defective, and where there was a certain amount of waste, the constant supply would not prove favourable to the Companies. He was by no means sure that it would be beneficial to all classes of persons. The introduction of a constant supply would entail enormous expense, because the whole cost of the fittings would have to be paid by the consumer.

Mr. *J. J. Durrant*, watchmaker and jeweller, was the next witness. He said he had a grievance against the Company who supplied his business premises in Cheapside. He was charged £16 16s. for his water supply, whereas some 15 years ago he paid only £6. There had been no increase in the water used on the premises. The rating was higher than it ought to be. It should be £700; but it was £856. Taking a fair average, he thought he used about 150 gallons of water a day, or 1000 gallons a week. No one resided on the premises. He thought the fairest way would be to charge upon the quantity of water consumed.

Colonel *Gouraud* said he was a partner of Mr. Edison, the electrician. He had a house in Northumberland Avenue, which he used as an office, and the rental was about £700 a year. He also occupied a house at Streatham, at a rental of £200. He believed the latter was supplied by the Southwark and Vauxhall Water Company, and the former by the Chelsea Company. He was so struck by the extraordinary inconsistency in the rating of the two places for water, that he asked his Secretary to see if there had not been some mistake. He was told there had been none. He then asked to be supplied with a meter; but was informed that he was not entitled to one. At the same time he found out what appeared to him would be an extraordinary state of things—viz., that although he was not entitled to possess a meter, yet the Company had the power, if they liked, to make him have one. In his Streatham house it was optional. The water-rate for that house was £12, although he had a large family living there, and had horses, grounds, &c., which, of course, entailed the use of a great deal of water. The rate for the house in Northumberland Avenue was £16 16s, although there was only a housekeeper and his wife living there, who used but a small quantity of water.

Mr. *S. Wood*, of the firm of Messrs. Alfred Lass and Co., then gave

some further statistical evidence. He submitted a statement showing the market value of the share and loan capital of the Water Companies on Dec. 31, 1889, and March 31, 1890, calculated at the prices quoted in the London daily stock and share list, issued under the authority of the Committee of the Stock Exchange. This list showed the nominal paid-up capital of the Companies to be as follows: Chelsea, £1,192,645; East London, £2,265,000; Grand Junction, £1,424,440; Kent, £870,024; Lambeth, £1,675,000; New River, £3,504,956; Southwark and Vauxhall, £2,195,750; West Middlesex, £1,304,916—making a total of £14,432,733. The estimated value was as follows: Chelsea, £2,538,892; East London, £4,463,269; Grand Junction, £3,017,937; Kent, £2,238,825; Lambeth, £3,763,747; New River, £10,933,375; Southwark and Vauxhall, £3,244,375; West Middlesex, £3,244,086—making a total of £33,444,506. Witness stated that in 1884 a parliamentary return was issued respecting the Companies, giving (among other information) the nominal amount of the share capital and its market value in 1871 and 1883; the figures as to the market value being furnished by the Committee of the Stock Exchange. In 1871 the share and loan capitals of the entire undertakings amounted to £10,016,164; in 1883, to £13,057,377; in 1889-90, as already shown, to £14,432,733. The market value of the undertakings in 1871 was £14,475,096; in 1883, £27,933,052; in 1889-90, £33,444,506. The average market value of the Companies' capital in 1871 was 144·51 per cent.; in 1883, 213·92 per cent.; in 1889-90, 225·48 per cent. The market value of the Companies' *ordinary* capital, independently of preference and loan capital, amounted at December, 1889, and March, 1890, to a total of £27,726,473. The amount proposed to be given in 1880 in exchange for the ordinary capital was: Immediate stock, £22,098,700; deferred stock, £9,300,000—total, £31,398,700. The value of this in 1880 was £29,734,281. Last year's dividend on the ordinary stock amounted to £921,905, equal to 3⅓ per cent. on £27,726,473 market value, which is 30 years' purchase of the dividend. Last year's interest on the preference and loan capital amounted to £175,021, equal to 3 per cent. on £5,718,033 market value, which is 32 years' purchase of the interest. With regard to the average prices of the Companies' ordinary stocks quoted throughout each year for the past ten years, the witness showed that unusually high prices were realized in 1880, but that these immediately dropped, and gradually declined till about 1884, from which time they steadily rose until last year the best prices were in some cases above, and in most cases nearly equal to, the highest figures quoted in 1880; the exceptions being Kent and Southwark.

The inquiry was then adjourned until to-day.

The Warrington Extension, Water, and Improvement Bill.—The alterations made by the Select Committee of the House of Commons before whom this Bill came have reduced to very narrow limits the advantages sought to be gained by the Warrington Corporation. With regard to the extension of the borough, the Corporation have practically failed in their efforts, as the Committee have only sanctioned the inclusion of a very small and unimportant area on the north side of the town. They have obtained power to purchase the water-works, and have succeeded in securing the suspension of the sinking fund for five years, by which they will be enabled to make the purchase without increasing the rates. Power has also been obtained to purchase gas annuities at market value instead of at 25 years' purchase.

Stainland Water Supply.—For many years the Local Board of Stainland have had under consideration the question of providing the district with a supply of water; and they now seem to be in a fair way of having the scheme they adopted carried through. At the last meeting of the members, the Clerk read a letter from the Local Government Provisional Board enclosing a copy of the Provisional Order they had issued under section 53 of the Public Health Act, 1875, sanctioning the construction of a water reservoir and other works by the Board. On the motion of the Chairman, it was agreed to take immediate steps to carry out the works; and the Clerk was instructed to advertise for the necessary money, the repayment of which was to extend over a term of 60 years. Further resolutions were passed asking the permission of the Local Government Board to the loan being spread over this period, and engaging Mr. Crowther to superintend the construction of the reservoir and works.

The Quality of the Coventry Gas.—At the last meeting of the Coventry City Council, two reports were before them on the subject of the quality of the gas supplied in the city. One was by the Gas Examiner (Mr. E. Godwin Clayton, F.I.C., F.C.S.); and it was to the effect that on the 26th and 27th ult., the quantity of sulphur contained in the gas was very large—being 52·8 grains per 100 cubic feet—and that steps should be taken to reduce it. The other was by the Medical Officer of Health, who reported that on the 11th inst. the quantity of sulphur in all forms equalled 10·62 grains per 100 cubic feet—showing, in his opinion, an unusually pure gas. In reference to these reports, the Chairman of the Gas Committee explained that the high figures returned by Mr. Clayton were caused by an accidental passage of sulphuretted hydrogen during the changing of a purifier. Alderman Dalton said he remembered some months ago calling attention to the quantity of sulphur in the gas, as experienced in certain factories; and then Mr. Andrews replied that the air in a factory was always purer near the floor than above. He thought the report of the independent Gas Analyst confirmed his statement, and showed that he was right and Mr. Andrews wrong. Mr. Andrews said he should like to add to his previous remarks that a similar accident had only been known to occur once before at the gas-works, and that was many years ago, during the time of the Company. The defect was soon discovered and remedied. With regard to what Alderman Dalton had said about the report confirming his statement made some months ago, it seemed to him (Mr. Andrews) that it confirmed exactly the opposite. It showed that when the gas was in its normal state, with 12 grains of sulphur, people imagined it to be full of this impurity; whereas when there happened to be four times the usual quantity of sulphur in it, nobody had the least suspicion. Mr. Loudon remarked that it was strange that an increase in the death-rate had taken place, and had existed during the last six months, simultaneously with the increase in the quantity of sulphur in the gas.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The question raised in the dispute which has arisen between the Glasgow Corporation and the Partick, Hillhead, and Maryhill Gas Company is one of greater importance than any I have yet had to chronicle in connection with gas undertakings. I listened to the discussion before Lord Kincairney,* and came away with the conviction that the action of the Corporation was, to say the least of it, beneath what might have been expected from such a body. If the Partick Gas Company introduced their service-pipes into the houses in question, the object they had in view was that the inhabitants might use the Company's gas. If an occupier had wished to use Corporation gas, it would have been open to the Corporation to have put in their own service-pipes, for which they have statutory power. But, according to Counsel, they are precluded from introducing service-pipes without compensation; and so, if the proprietor had declined to pay for them, the presumption is that they would have been unable to insert their pipes, and the tenant could not have had the Corporation gas. There is no dispute that, in houses where Corporation gas is supplied, the service-pipes belong to the proprietor of the house; and if in one of these an occupier were to say he wished to use the Company's gas, the proprietor would be entitled to object in two ways. He could, on the one hand, say he would not allow his service-pipes to be used for the passage of the Company's gas; or, on the other, that he would not allow the Company to break up his property by introducing their pipes. So that, to a certain extent, the proprietor has a control of the gas supply. But the case in dispute is very different from either of the suppositions I have cited. In this instance, the proprietor wishes to use a power which is quite feudal in its nature, and therefore antagonistic to the spirit of modern legislation. If he should be successful in appropriating these pipes, the Corporation assuredly will not pay for any service-pipes belonging to the Company when the inevitable transfer takes place; and that will mean the loss of several thousand pounds to the Company. Almost everyone will admit that the Corporation should be above adopting any such trick, to lower the value of a property which they require to buy. Lord Kincairney's decision to let things remain as they are is, not very favourable to the Company, because it leaves the Corporation in possession. When the question comes to be decided on its merits, it will be more difficult for the Company to interdict the Corporation from coming in, seeing that they are already in, than if they had not been allowed to enter at all. In fact, the position is now more suitable for an action of declaration and damages than of interdict. But in that case, again the Company would be put to the disadvantage of satisfying a Judge that the Corporation were *not* "entitled" to enter the houses; and seeing that their principal element of success in such a suit would consist in proving the limitations of the Corporation's powers, their difficulty would be vastly increased compared with what it would be were the questions simply this—that being in possession, they were entitled to keep all others out until the others proved their title to come in. That would have raised a clearer and simpler issue upon the question of "annexation" than is possible now that Lord Kincairney, though protesting that he decided nothing, has given a *primâ facie* aspect to the contention that the Corporation were entitled to enter the property in Belmont Street, and appropriate the service-pipes. As the Court of Session has risen for the Long Vacation, and will not sit again before the middle of October, nothing further can be done till then; but early in the winter session it may be expected that the question will come on for trial on its merits, either upon the conclusion for interdict or in an action for declaration. When it does come up, it is certain to be eagerly watched, as its decision will be of great moment to the owners of all gas undertakings in Scotland, and probably those throughout the United Kingdom which are not in the hands of local authorities.

An action which illustrates how employers of labour are sometimes penalized, even in a Court of Justice, for trivial events, was tried before Lord M'Laren and a jury in the Court of Session at Edinburgh last Monday. The pursuer, Peter Duffy, labourer, 36, Elbe Street, Leith, sued the Edinburgh and Leith Corporation Gas Commissioners for damages to the amount of £500 at common law, or £165 15s. under the Employers' Liability Act, for personal injuries. He stated that on the morning of the 23rd of December last, while he was assisting to empty a purifier in the Leith gas-works, the gas gained access to the light of a safety-lamp he was using, and a large outburst of flame—called by the newspapers an explosion—occurred, by which he was burned about the head and body to such an extent that he had been unable to resume work. He maintained that the lamp which was supplied to him was defective in respect that the wire gauze at the bottom was either torn or was absent altogether. In the witness-box, he said he had just broken the top tier of lime, and had handed the safety-lamp to a fellow-workman, and was in the act of receiving it back when the accident occurred. For the defence, it was stated that Duffy was only slightly burned. It was also contended that it was contrary to the rules of the works to take a lamp inside the purifier; and it was denied that the lamp was defective. Their theory was that when the lime was broken, the gas confined below the first tier escaped upwards; and that but for the carelessness of the pursuer in passing the lamp across above the opening in the lime, whence the body of gas was ascending, there would have been no accident at all. The Commissioners paid pursuer his full wages till the end of January, when he raised the action; and on record they offered to give him £15, to pay all his expenses, and to take him back into their employment, giving him light work until he was able to resume his old duties. This very fair offer was declined, and the case went to trial. In his evidence, Mr. Linton, the Manager of the works, said he was quite willing up till then to take Duffy back; but if he were awarded damages, he would require to consult the Commissioners before doing so. The jury took the side of the pursuer, and awarded him £100, which carries costs, but leaves pursuer to pay for his medical attendance. The verdict was not obtained upon the medical evidence, for two of the most eminent men in the city told the jury that their opinion,' in

* Owing to the pressure on our space to-day, we are compelled to hold over again the report of the arguments in this case.—ED. J.G.L.

February last, was that Duffy should get light work to do. What alone could have impressed the jury was Duffy's own account of his sufferings—which included the pathetic statement that his finger-nails came off and some of his teeth fell out after the accident. What, I presume, in reality, led them to return the verdict they did was that they had before them, on the one hand, a poor man who had suffered, and, on the other, a rich Corporation who were well able to pay; and they probably did not adjust the balance very nicely, but, out of sympathy, threw their vote into the scale in favour of the pursuer. If that were so, how very much they were mistaken. Duffy is a well-to-do man, who, in addition to working in the gas-works, carries on business on his own account in Leith, and is either owner or tenant of a holding in Ireland. As a matter of fact, he made no secret, among his fellow-workmen, before he met with the accident, that he intended to give up working among them in May, and attend to his other ventures. This was the reason he refused the offer of the Commissioners. He, or his lawyer, played his cards well; and out of a trifling incident he has been able to secure a good bonus on leaving the service of the Commissioners. The sum is nothing for them to pay, but the example is a bad one for other workmen; and so long as this decision stands, they will have difficulty in fighting another case of the same kind. It is therefore worth while considering whether they should not try to obtain a reversal of the principle of law involved in holding them liable under the circumstances which were disclosed, so as to prevent them being pestered by claims at the hands of lawyers of the speculative class, on behalf of workmen who may sustain injuries.

The annual accounts of the Forfar Gas Corporation were submitted at a meeting on Monday night. They stated the income for the year at £5730 19s. 10d., which included £4420 12s. 11d. from gas and £648 9s. 6d. from residual products. The expenditure was £5496 5s. 1d., of which the chief item was £2236 6s. 8d. for coal. The surplus was £234 14s. 9d. The year has not been a very satisfactory one for the Corporation. They estimated a revenue of £5315, and, including the balance brought forward, they only realized £5025. They estimated an expenditure of £5190, and exceeded it by £306. Their income for the past year was lower than that for the previous year by £388; but their expenditure was also less by £97. The worst feature, however, about the position of the Corporation is that their output of gas was less by 400,000 cubic feet, having been 24,740,000 in the past year, and 25,140,000 in the previous twelve months, when a decrease was also reported, to the extent of 44,000 cubic feet, upon the output for the preceding year. Matters, it must be confessed, do not look very promising for the Corporation. At their meeting on Monday night it was reported that the output of gas for the preceding month was less by 17,000 cubic feet than in the corresponding month of last year, so that the decline in business seems to be continuing. The Corporation were offered annuities to the amount of £22 14s., of the capital value of £550, and resolved to purchase them.

The Lochgelly Gas Company—a young undertaking—has closed a good year, and is about to extend its mains. A dividend at the rate of 6½ per cent. has been declared for the past year. But what is of more consequence, as showing the conditions under which business will be carried on in places which are under the control of authorities other than municipal, is that the Company has paid a sum of £20 0s. 6d. to the Road Trustees for way-leave for their mains. Had the road authority been a body elected by the residents, it is very unlikely that such a charge would have been made.

The Aberdeen Town Council on Monday got out of the difficulty into which it landed itself a month ago in discussing the question of reporting tenders for furnishings to the Council. By a majority, they adopted a resolution that in future all tenders for the supply of materials or work be opened in the presence of the Committee in charge of the matter to which the offers relate; that the prices or rates of the tenders accepted be inserted in the minutes, except in the case of the annual contracts for the supply of materials, furnishings, and work, where the names of the contractors shall merely be given, as hitherto, and the annual contracts for the supply of coal in connection with the gas undertaking, in regard to which the average price per ton shall only be inserted. This leaves matters pretty much as they were, except that in future the Convener of the Gas Committee will require to call the Committee together before opening the tenders for coal. This is certainly the right thing to do. The discussion, it will be remembered, arose over the opening of the tenders for coal for the gas-works.

Reporting the other night to the Perth Police Commission on the cost of public lighting for the past year, Treasurer Dewar stated that they had expended £1429 0s. 11d., which was £235 12s. 10d. more than in the previous year. This increase, except a small sum on account of raised wages to lamplighters, was accounted for by the expense of lighting the extended boundaries. Last year 118 new lamps were put up, and this year they expected to overtake the whole of the extended boundary; and when they had completed the additions provided for in this year's estimate they should have, in round figures, 1000 public lamps under their charge. Although they had added 118 lamps, which should have cost for gas about £1 2s. each, the amount paid to the Gas Commissioners was only £19 more than in the previous year. This result was due entirely to the careful way in which Mr. Welsh took advantage of the moonlight nights last winter. It cost them about 7s. per hour for gas to the public lamps; and the difference between judicious economy and careless management in that department would very soon be felt.

A fatal accident is reported to have occurred to Mr. A. Lobban, Manager of the Kinross Gas-Works. As he was proceeding along the North British line to Kinross Junction last Wednesday, he was knocked down by an express train and killed.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

There has been an unusual amount of talk among colliery owners and coal merchants regarding the purchases of coal made this season by the Coal-Purchasing Committee of the Glasgow Gas Trust. Some of the firms that have been "left out in the cold" in the placing of the contracts have been somewhat severe in their criticism of the Committee's doings and their policy. Upwards of 180,000 tons of coal and shale have been purchased; but there is a large quantity of coal of the past year's contracts still undelivered. According to some outsiders, the quantity is at least 50,000 tons; and going on the assumption that they are right on that point, they affirm with confidence that the Committee will yet have to go into the market again for not less than 100,000 tons; alleging, with a little touch of malice, that the coals that have yet to be bought will not be obtainable at the next purchasing time on the same terms as the late buying was done at. Comparatively little really good cannel seems to have been bought by the Committee—perhaps two lots at 20s. and 21s. per ton. One of these will be delivered from a Fifeshire colliery; and the other is only for 1000 tons. There are several lots of 5000 or 6000 tons, chiefly Lanarkshire splints or "pugs"—a kind of splinty or bastard cannel; and the orders for these have chiefly been placed with colliery firms in the Hamilton district, the price per ton generally ranging at a few pence over 9s. Two lots of considerable extent will be supplied from the Airdrie district; and one order that has been placed in the Hamilton district is for 20,000 tons. A colliery in the Kirkintilloch district has had a fairly good line; and another further east, in the direction of Greenhill, has got a "line" for a smaller quantity at, I am authoritatively informed, an advance of 2s. 6d. per ton on the price at which the same coal was sold a year ago, and which at present is decidely under 10s. per ton. Some of the coal purchased will come from a colliery in the direction of Shotts. This is said to be a cannel whose coke is practically valueless, and the price is given to me as 10s. 6d. per ton. The biggest order that has been placed is for 50,000 tons of Lanemark cannel, as against 40,000 tons last year. Amongst the outsiders, the price of the Lanemark coal is put down at 14s. per ton; but I have good reason to know that it is more. I have heard it said very positively, though not on authority, that the Lanemark Coal Company might have got 2s. more per ton. Possibly; but I do not believe it. I may yet have a few more data on coal sales and prices before the buying season has actually closed.

At the Port Glasgow Town Council meeting, held on Wednesday evening, the Corporation Gas Committee's affairs were up for consideration. It was stated in the minutes that three offers had been received for the purchase of the tar and ammoniacal liquor made at the works—from the Gas Residual Products Company, Limited, the Glasgow Alum and Ammonia Company, Limited, and Messrs. G. Walker and Sons, of Ayr. That of the Residual Products Company was accepted. One of four offers for the supply of lime was accepted; the price to be 15s. 9d. per ton, delivered free at the gas-works. The Town Clerk had submitted to the Committee a list of offers for coals which he had made up, together with one of coals proposed by the Gas Manager for acceptance by the Committee. After giving the matter due consideration, the Committee had agreed to accept the list selected by the Manager, the same being as follows: Lanemark cannel, 500 tons, at 16s. per ton; Home Farm and Bog (Hamilton) cannel, from Jas. M'Kelvie, Edinburgh, 900 tons, at 13s. 8d. per ton; Nether Johnstone coking coal, 900 tons, at 11s. per ton; Ferniegair splint coal, 200 tons, at 10s. 9d. per ton—in all, 2500 tons, at an average price of 12s. 11d. per ton. It is stipulated in the contracts that the offers are accepted on condition that clauses as to strikes and other contingencies be dropped by the offerers where such clauses were inserted.

At the last meeting of the Gourock Police Commissioners, sitting as the Gas Authority, Mr. Craig submitted and moved the adoption of the financial statement of the gas supply undertaking for the year ending May 15, 1890. It showed that after all the debts had been discharged, including interest and repayment of loans and bank interest, there was a balance of nearly £300 in favour of the undertaking in the shape of surplus—what Mr. Craig called "a large surplus." He was sure that it would be to all parties a matter of congratulation that they had such a large surplus at the disposal of the Commissioners. The receipts included over £2200 for the sale of gas, £55 3s. 4d. for rental of meters, £14 as rental of gas-stoves, nearly £275 for residual products, £58 18s. 10d. for service-pipes and fittings, and with certain miscellaneous receipts the total came up to £2614 1s. 11d. The year's expenditure was £2320 2s. 0d.; including, under the head of manufacture of gas, the sum of £1392 13s. 1d. The question of meter-rents was brought up by Bailie Gunion, who moved the discontinuance of the same. He had, he said, brought the same matter up in May, 1888; and when he consented then to withdraw his motion, representations were made to him that it was at that time premature, and that their funds did not warrant them in taking away the meter-rents. The great majority of the members at that meeting, however, promised to support him if he brought forward his motion when their funds were in a more flourishing condition. That time, he held, had now arrived; and he thought they should now take steps to do away with such an absurd, ridiculous, and tantalizing tax. He alleged that they were charging for the rent of meters that had been paid for by the tenants themselves. Of course, that referred to a long time ago; but notwithstanding that, the statement was quite true—at least, so he was informed. Mr. Tait said he would be sorry to be connected with the Commission if such a thing were true. That was simply a charge of fraud. Mr. M'Ewan, the Gas Manager, stated that he knew nothing about such a thing, to which Bailie Gunion replied that Mr. M'Ewan need not trouble himself about the matter, as the thing occurred before his time. The Provost remarked that during all his experience he had never known of such being the case, and he hoped that would be understood distinctly. Mr. Simpson seconded Bailie Gunion's motion, as he had pledged himself on the platform to oppose the meter-rent referred to. The Provost moved a direct negative, contending that to take the meter-rents away would be to the advantage of one class of consumers at the disadvantage of another. He gave figures in support of his argument; and said that the just and proper course to follow would be to reduce the price of gas, if they could do so. The amendment was seconded; and four votes were recorded for the motion and four for the amendment. The Provost gave his casting vote in favour of the latter, which was accordingly carried. Commissioner Simpson gave notice of the following motion: "That the price of gas be reduced by 2½d. per 1000 feet; said reduction to take effect in September accounts."

The annual meeting of the shareholders of the Lockerbie Gas Company was held on Wednesday. It was shown by the report that there

was a sum of £235 os. 11d. available for division amongst the shareholders, out of which it was agreed to declare a dividend of 8 per cent. The Directors referred with pleasure to the growing demand for gas, and to the fact that the value of residual products seemed to be steadily recovering from the serious fall in prices which occurred a few years ago. At the same time, however, they regretted very much to note the recent large and serious rise in the price of coal—so large, indeed, as to render it probable that the new contracts to be made for coal may not be placed to the advantage of the shareholders. It is expected that the works will require a general overhauling, and perhaps considerable renewals, in the course of the ensuing financial year. The report and the recommendations of the Directors were agreed to.

The Glasgow pig iron market has been more regular this week. Scotch warrants have fluctuated in price between 46s. 2d. and 45s. 5d. per ton cash yesterday. There is still a hopeful feeling in many quarters, but legitimate business itself does not seem quite so strong.

There has been a good demand for shipping coal, but furnace varieties are in less request at home. In some instances, prices are a shade easier. Splint coal is quoted at 9s. to 9s. 3d. per ton; main coal, at 8s. 9d.; steam coal, at 10s. 9d. to 11s.; and ell coal, at 9s. 6d. to 10s. 3d. per ton.

A local report of the sulphate of ammonia markets for the past week says: Owing to Fair holidays in Glasgow, no report was issued last week. The market for sulphate of ammonia has been dull this week, with little doing. A few sales have taken place at £11 5s. usual terms, but buyers do not seem inclined to operate. For forward delivery, no business of importance has taken place.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July 26.*

Sulphate of Ammonia.—There is not much business passing; but prices remain unaltered—no doubt, in consequence of the scarcity of prompt parcels. Hull is quoted £11 7s. 6d. to £11 10s.; and the latter figure has been realized at Liverpool. But at Leith several transactions were reported at £11 5s. per ton. The values for near delivery will depend upon the demand; and there will meanwhile be little sulphate available during the next few weeks, as many works will be standing for repairs, as is usually the case at this time of the season. There have been some further American orders; and inquiries continue. Nitrate remains firm in tone.

LONDON, *July 26.*

Tar Products.—The stagnation usual at this time of the year continues. Carbolic crude is now inquired for at 2s., buyers, who would probably pay a little more. Tar oils are in good demand, although no marked increase of price can yet be notified; but the American demand seems likely to affect value before long. Benzols remain at 2s. 10d. for 50 per cent., and 3s. 10½d. for 90 per cent. Buyers of anthracene are offering to pay 1s. 3d. for best makes; but they seem indisposed to exceed this limit until they have experience of how alizarene prices will be fixed for the future. Pitch is out of season.

Sulphate of Ammonia.—The price for present delivery is £11 10s. Forward sales are reported at £11 12s. 6d. and £11 13s. 6d.

South Hants Water-Works Company.—The water-rental of the Company during the past half year increased by £331; and the net profit on the working was £1231.

Proposed "Corner" in Anthracite Coal.—The *South Wales Daily News* announces a proposed combination of all the anthracite collieries in South Wales. The scheme provides that a Company shall be established to buy up all the anthracite collieries in South Wales, paying half in cash and half in shares; and that in this way full control of the whole output of anthracite shall be obtained. It is said to be about 1,250,000 tons.

Dissatisfied Water Consumers in Buenos Ayres.—According to the *Financial News*, the inhabitants of Buenos Ayres have resolved *en masse* not to pay their water-rates. The rates are payable in gold, and, with the premium at 211 per cent., payment is not unnaturally regarded as a hardship, which the good people of Buenos Ayres do not intend to put up with. The Buenos Ayres Water Supply and Drainage Company dates from the latter part of 1888; the concession taken over by the Company stipulating that the people were to have their supply from the Company.

The Leeds Corporation Gas Committee and the Recent Lock-Out.—The social bodies in Leeds one and all appear to condemn the actions of the Leeds Sub-Gas Committee which led to the recent riots in the borough. Last Thursday, the Holbeck Pitt Club at a special meeting passed the following resolution: "That this meeting most strongly condemns the members of the Sub-Gas Committee of the Leeds Town Council for the mismanagement of affairs in connection with the recent lock-out of the gas stokers, and also desires to express our extreme regret that Councillor Musgrave should have felt himself compelled to support such Sub-Committee in their action, and that a copy of this resolution be sent to Mr. Musgrave."

A Shade-Holder Patent Case.—Last Tuesday, Mr. Bosanquet, Q.C., appealed to the Master of the Rolls and Lords Justices Lindley and Bowen on behalf of the plaintiffs in the case of *Meyer and another v. Sherwood and Sons* from a judgment by Mr. Justice A. L. Smith, after a trial at Birmingham. The action was for an injunction to restrain the alleged infringement of a patent for an improvement in shade-holders in gas and other lamps; and after postponement of the trial for the plaintiffs to apply to amend their patent, the verdict was practically for the defendant. After Mr. Bosanquet had stated the appellants' case, and asked for judgment and an injunction, Mr. Wells, for the respondent, said they continued, as at the trial, willing not to manufacture these shades, nor had they made them since, though he conceded, in reply to Mr. Bosanquet, that some few had been sold. The Court thought this a fair settlement; and the appeal was dismissed with costs, on the defendants undertaking not to make or sell any of the articles complained of.

Brentford Gas Company.—The Directors of the Brentford Gas Company recommend the payment of dividends for the past half year at the rate of 5, 12½, and 9½ per cent per annum, carrying forward £35,181.

Exhibition of Gas Appliances at Farnham.—An interesting exhibition of gas appliances was held, during the past week, in the Farnham Town Hall, under the auspices of the local Gas Company. The stoves and appliances on view were specimens of the well-known manufactures of Messrs. H. and C. Davis and Co., of London. Twice each day, Miss Johnstone, of the South Kensington School of Cookery, gave successful demonstrations of her art to large and appreciative audiences.

The Interference with Regulators at Sheerness.—The Street Lighting Committee of the Sheerness Local Board report that, in connection with the recent discovery in regard to the removal of the regulators from the metered lamps, recently referred to in the JOURNAL, they are of opinion that they had not been opened for years, and that instead of the lamps consuming 4 cubic feet of gas per hour the quantity burned has exceeded this amount by 20 per cent. On this report, the Local Board have passed a resolution that they will insist firmly on the Directors of the Company acknowledging that their insinuations as to the affair being questionably brought about were made without the slightest foundation. Whether or not the Directors of the Gas Company will do this remains to be seen.

The Lancashire Coal Trade.—There is very little change in the coal market from last week. Prices are well maintained all round, and the business put through is most satisfactory considering the season of the year. Most of the collieries are fully employed; and the output, so far as appearances go, does not much exceed the demand. House-fire coal sells freely, and best descriptions are quoted at 11s. to 11s. 6d. per ton at the pit's mouth, with 9s. 6d. to 10s. for seconds; the commoner sorts fetching from 8s. 6d. to 9s. per ton. The activity in this branch of the coal trade is due to the anticipated rise of prices on the 1st prox. Agents are buying heavily, and co-operative societies which supply customers on a large scale are accepting forward contracts at existing rates. Good ordinary qualities of round coal are in request, and no difficulty is experienced at clearing what is being turned out at 8s. 6d. per ton at the pits. Coke is in limited demand, and prices show little if any change.

The Eight-Hour Movement.—A great demonstration, under the auspices of the Gas Workers' Union, took place last Sunday afternoon in Hyde Park to celebrate the anniversary of the eight-hour day, and for the advocacy of trades unionism and "combination of all labourers for the benefit of all classes interested in labour and labourers." The various contingents marched to the *rendezvous* with the usual display of banners, and accompanied by bands. Addresses were delivered from five platforms. Mr. John Burns was at No. 1; and Mr. Cuninghame Graham, M.P., was also present. The following resolution was proposed simultaneously from the various platforms, and carried unanimously—"That this meeting hails with joy the anniversary of the date upon which the Gas Workers' and General Labourers' Union obtained the eight-hour day in the gas-works without any reduction of wages, proclaims the necessity of securing the international shortening of the hours of labour by legal enactment, and pledges itself to work for the eight-hours legal working day as the most immediate step towards the ultimate emancipation of the working classes." It is estimated that about 8000 people took part in the demonstration.

The Price of Gas in the Wigan Out-Townships.—A public meeting of the inhabitants of Pemberton and Orrell was held last Thursday night, "for the purpose of taking into consideration the high price of gas charged by the Wigan Corporation to the out-townships." It was stated by Mr. J. Moorfield, the Chairman, that for some time the inhabitants of Pemberton had been charged an enormous price for gas. Another speaker said there was a difference of 8d. per 1000 cubic feet between the price charged within the mile radius and that without the area, and there was also much grumbling at the quality of the gas. He quoted the prices charged in other places, all of which were lower than the 3s. 9d. charged by the Wigan Gas Committee to the out-township consumers. A further grievance was in the price charged for meters. For a small meter it was 3s. 4d.; while for one of larger size it was 7s. Mr. W. R. White informed the meeting that the Local Board were taking action in the matter. A resolution was passed expressing the opinion that the time had arrived when the Corporation of Wigan should supply the district with gas at the same rate as that charged to consumers within a mile radius.

New Joint-Stock Companies.—The following joint-stock undertakings have lately been registered: The *Brilliant Light Company, Limited*, with a capital of £15,000, in £1 shares, is to acquire certain inventions, also letters patent in respect thereof, granted to Sir James Nicholas Douglass, and also an invention in burners, and the letters patent granted to the Patent Argand Gas and Oil Burners Company, Limited, and Mr. R. T. Strangman, and to carry on the business of gasfitters, lamp manufacturers, &c. The *Damiel Light Company, Limited*, with a capital of £1400, in £1 shares, to adopt an agreement made between Messrs. C. F. Kinderman and Co. of the one part, and Mr. T. F. Richardson, on behalf of the Company, on the other part, for the supply to the Company of gas-burners. The *Franco-African Lighting Syndicate, Limited*, is to have a capital of £25,000, in £1 shares; the object of the undertaking being to manufacture, sell, and supply light or luminant of any kind, and heat engendered by gas or otherwise, in Algeria, Tunis, or any other part of the French dominions or protectorate. The *Pamplona Water-Works, Limited*, with a capital of £141,000, in 14,000 "A" and "B" £5 shares, and 100 founders' shares of £10 each, has been started with the object of entering and carrying into effect an indenture made between Joseph Dierden, Alfred Beavis, and Philip C. Tennant for the acquisition by the Company of a concession to make water-works in Pamplona, a province of Navarre, Spain; for the construction of works, the acquisition of lands, and the formation, registration, and floating of the Company; and for carrying on the general business of a water company.

Increase in the Price of Gas at Bishop Stortford.—Owing to the increase in the price of coal, the Directors of the Bishop Stortford Gas Company have resolved to raise the price of gas from 4s. 2d. to 4s. 4d. per 1000 cubic feet. Great dissatisfaction is expressed by consumers.

Electric Lighting Proposals.—Notices by electric lighting companies of their intention to apply for powers to erect works and supply electricity have recently been given to the public authorities of the following towns: Buxton, Cardiff, Dukinfield, Halifax, Keighley, Leamington, Rochdale, Sheffield, and Slough.

The Water Supply of Belfast.—The Belfast Water Commissioners, accompanied by their officials, proceeded last Tuesday to Stonyford, for the purpose of inspecting the new water-works, and advantage was taken of the occasion to formally inaugurate them, the ceremony being performed by the Chairman of the Board (Mr. W. S. Carlile). Having been presented, on behalf of the Commissioners, with a silver turncock's key of handsome design, Mr. Carlile briefly addressed those present, reminding them that four years had elapsed since the first sod was cut in connection with the works. He then turned on the water into the conduit leading to the city. A luncheon to celebrate the event was given in the afternoon.

Cleveland Water Company.—From the Directors' report and the statement of accounts of this Company for the half year ending June 30 last, it is seen that, after providing for interest, rents, and other preferential charges, there remains a balance of £2474 which enables the Board to recommend that a dividend at the rate of 5 per cent. per annum on the original and "A" shares, and of £4 4s. per cent. per annum on the "B" shares (free of income-tax) be declared, and that £250 be added to the contingent fund. This will absorb £2122, and leave a balance of £352 to be carried to the credit of the next accounts. The statement of accounts shows that, owing to increase of revenue from water-rents, the disposable balance is £500 greater than at the corresponding period of last year, when the dividends declared were £4 10s. and £3 3s. per cent. The addition of £250 to the contingent fund will raise it to £3000.

Liverpool Corporation Water Supply.—The finishing touches are being given to the Oswestry section of the Liverpool Corporation Water-Works; the buildings, roads, paths, and other minor works, being now all but completed. The great compensation reservoir, filter-beds, clear-water tank, valve-house, and outlet works were ready some time ago. The contractors were Messrs. Davies Bros., of Wrexham; and the amount of the original contract was about £70,000. The reservoir into which the water from Lake Vyrnwy enters from the Llanforda tunnel is a picturesque sheet of water, the storeage capacity of which is 46,112,000 gallons. There are three filter-beds, with space for a fourth; and in the distance of a third of a mile, which separates the first filter-bed from the reservoir, there is a fall of 120 feet. The beds are the largest ever constructed; each measuring 400 feet by 180 feet, with a depth of 7 ft. 6 in. The area of the clear-water tank is 200 feet by 150 feet; and the depth is 17 feet. The valve-house contains provision for meeting very remote contingencies.

An Electric Lighting Difficulty at Moss Side.—At the monthly meeting of the Moss Side Local Board yesterday week, a letter was read from the Board of Trade, stating that they regretted they could not accept the Local Board's suggested amendments to the Provisional Order of the House-to-House Electric Lighting Company, referring to the electric lighting of Stretford and Moss Side, as they could see great difficulties in the way of keeping separate accounts for the portions of the undertaking situate in the districts of the two local authorities. The Clerk (Mr. Crofton) said that when the Board consented to the Provisional Order, it applied to Moss Side alone; but the Company, without consulting either Stretford or Moss Side, had linked the two together, and intended to have only one station for the two districts. This might cause serious difficulty at the end of twenty years, when the Moss Side Board would have the option of purchasing the undertaking. A Sub-Committee was appointed to confer with the Stretford Board as to the advisability, under the circumstances, of opposing in Parliament the confirmation of the Order.

Colne Valley Water Company.—The ordinary meeting of the shareholders of this Company will be held on the 1st prox., when the Directors will report that the total amount of capital expended during the half year ending the 30th ult. was £2138, most of which, as usual, was spent on extensions of mains. New shares were issued in the six months to the amount of £4720; this being the balance of the sum authorized to be issued by the shareholders in 1883. It is the intention of the Directors at the forthcoming meeting, to apply, for the sanction of the shareholders to issue further new shares from time to time as may be required, not exceeding in the whole £10,000. A very favourable result is shown as regards the revenue account; the net increase being £301, as compared with the corresponding period of 1889. The dividend and interest account exhibits a balance of £1768, after paying the usual 4 per cent. interest on the debenture stock and preference shares, and transferring £100 to the reserve account. Out of this balance, it is proposed to pay a dividend at the rate of 2½ per cent. per annum; leaving £360 to carry forward.

The Northern Coal Trade.—There is still great activity in the steam coal trade, and the price of best steam coal is firm at 13s. per ton free on board. Second-class qualities vary from 11s. 6d. to 12s. 6d.; and the inquiry is not quite so good as for best. Small steam coal is 6s. 6d. to 7s. per ton; and is rather more plentiful. For gas coal the demand is increasing, and some very heavy contracts are in course of negotiation. Those which have been completed seem to be at about 11s. 6d. per ton for best Durham coals; and when odd cargoes are bought, the price varies from this figure up to about 13s. 6d. In one instance, it is said that as high as 14s. was paid for a cargo of 1500 tons, with exceptionally quick delivery. A growing demand for coal for the local gas-works is now beginning to show itself as the nights lengthen. There is a fair business in manufacturing coal; but the supply is fully adequate. The same remark applies to bunker coal; and the price of the latter is a little weaker. For household coal, the demand is very small, and the price weak; the competition being keen for the summer and autumn supply. Blast-furnace coke is in better request; and the price is firmer. Gas coke sells steady at old prices.

The Wolverhampton Town Council and the Quality of the Gas Supply.—At the last monthly meeting of the Wolverhampton Town Council, the Streets Committee presented a report on the subject of an interview they had had with the Directors of the Gas Company in reference to complaints which had been made of deficiency in the illuminating power, its inadequate pressure, and the unsatisfactory methods in use for testing it. The Committee pointed out that while the tests generally showed 15 candles illuminating power, the minimum was on certain occasions below this; and they called upon the Company to provide proper means of testing the gas, saying that if this were done they might show a marked difference in the illuminating power, and would be the means of ascertaining whether the Company were supplying gas of the quality provided by the contract. The Committee furthur pointed out to the Directors that they only guaranteed to supply an illuminating power of 15 candles, while the gas in Birmingham gave an average of 17 candles; and they asked the Directors to name a price at which they would be willing to supply a guaranteed illuminating power equal to 16 or 17 candles. With reference to the points submitted to them, the Company replied as follows: (1) That they were unable to give a price at which they could guarantee either a 16 or 17 candle power gas; and that they could not do more in the future than they had in the past. (2) They could not provide the tests referred to by the Committee, or give more than one test for the whole borough. These replies the Committee regarded as unsatisfactory; and they expressed the hope that the Directors might be prevailed upon to reconsider their decision previous to the contract for next year being renewed. Mr. Johnson, in moving the adoption of the report, remarked that he considered the answers of the Company extraordinary and incomprehensible. Alderman Annan said the prices for coal had been advancing so rapidly that it would be almost impossible to give a price for gas of a higher illuminating power. Next year's coal would cost £8500 more than in the year 1888. The Company were anxious to do everything they could for the borough. The report was adopted.

The Gas Workers' Dispute at Barnsley.—In connection with the recent gas workers' dispute at Barnsley, an open-air meeting was held last Thursday night, under the auspices of the local branch of the Gas Workers' Union. One of the speakers was Mr. Paylor, who said he had tried all means to arrange an amicable settlement with the Manager of the Barnsley Gas-Works (Mr. W. W. Hutchinson); but that gentleman had refused to treat with him in any way. Mr. Hutchinson had shown the disposition of a man who was fighting a selfish battle, a personal battle, and not a question wherein the interests of workmen and shareholders were concerned. He had found the Chairman of the Company a little more gentlemanly; but he had learned from him that they had no intention of ever taking back any of their old hands. Without indulging in high-flown language, he must say that when the Chairman, Directors, or Manager spoke in that strain, they were saying more, perhaps, than they would care to vouch for, because they had to deal with a Union which was over 120,000 strong; and when they had to deal with a Union of that strength, it was not a question for one party to say what they would do. It was a question of more than one party; and they had not yet said the last word on the subject. It was now costing the Company £2 a day for policemen to guard the blacklegs in the works, besides food; and more than that, they were threatened with opposition in the shape of an electric lighting scheme. He knew that thirty men could be sent to Barnsley to scale the walls of the works, and drive the blacklegs out; and it only required him to say the word to bring them there. But he did not want to do it, because he did not wish to send any man to prison; and he knew that would be the result of it. He had tried to settle the matter amicably, and he had failed; and whatever might come, it ought to come upon the heads of the Gas Company. He suggested that they could make the dispute more costly to the Company by walking past the works in the evenings with good cudgels in their hands; for that would soon lead them to double the number of police there. Messrs. Hutchins and Tayler also spoke; and a resolution pledging the meeting to support the locked-out men was carried.

Electric Lighting for Barnsley.—The burgesses of the South-West Ward of Barnsley held a meeting last Thursday to consider the question of the introduction of the electric light into the borough. The resolution brought before the meeting was to the effect that those present—having regard to the very "arbitrary and discourteous manner" in which the Gas Company had for many years treated the Town Council and gas consumers generally, and believing that the electric light was a much superior illuminant, and that it only needed to be introduced and maintained for a few years to effectually break down the monopoly which had so long existed—were of opinion that the Corporation should at once put down an installation for the supply of electricity; and it concluded with an instruction to the ward representatives to support the recommendation of the Park and Lighting Committee in regard thereto (*ante*, p. 210). In moving the resolution, Mr. Qualters pointed out that the works with which he was connected in Barnsley had adopted the electric light; and they were satisfied with it. The Birley Vale Colliery Company, near Sheffield, had, he said, put down electric lighting plant at a time when they were paying 2s. 6d. per 1000 cubic feet for gas; and they now found it had saved them £200 during the year. He thought they ought to have the electric light if it was only to break down the monopoly of the Gas Company. The resolution having been seconded, Mr. Jackson, a member of the Town Council, supported the recommendation of the Lighting Committee; and he pointed out that the Barnsley British Co-operative Society were so satisfied with one electric lighting plant, that they were putting down another. Mr. Woodcock stated that there were now 732 lamps in the borough; and the electric light would only enable them to replace 248 lamps, leaving 484 still to be lighted with gas. He did not think the borough was in a position to expend such a large amount as would be required for electric lighting; and he moved as an amendment—"That this meeting of the burgesses of the South-West Ward, while acknowledging the value of the electric light, is of opinion that it has not yet reached that stage of cheapness and utility necessary for the lighting of this borough; and, therefore, requests the Town Council to delay its introduction for the present." On a vote being taken, only two hands were held up in favour of the amendment; and the resolution was afterwards unanimously carried.

The Dangers of Electric Wires.—According to a telegram from New York, a tree was struck by lightning during a storm which prevailed at Chester (Penn.) last Thursday week. In its fall it broke an electric wire, which lay over the track of a tramway. The horses of a passing car stepped on the loose wire, and both fell instantaneously to the ground. One was found to be dead; the other stunned by the shock.

The Salford Petition for the Release of Samuel Hunter.—In the House of Commons last week Mr. Cuninghame Graham asked the Secretary of State for the Home Department if he had received a petition for the release of Samuel Hunter, represented to be from "Magistrates, members of the Town Council, and inhabitants of the county borough of Salford;" and if he could grant the prayer of the petition. Mr. Matthews said he received such a petition in August of last year; and he replied that it was not a case in which he could advise any interference.

"Portable" Gas in Paris.—It may not be generally known that the Paris Gas Company is not the only supplier of gas in that city. Another Company exists, which manufactures from Scotch Boghead what is known as "portable" gas. This is compressed to 10 or 12 atmospheres in iron cylinders, which are despatched to consumers' premises, where the gas is passed into fixed vessels for use as required. The gas was extensively employed some twenty years ago; but the consumption has since greatly diminished. The consumers are mostly residents in the suburbs; the remainder being in the city.

The Responsibilities of Gas Companies.—At the Devon Summer Assizes last Thursday, before Mr. Justice Mathew, the Exeter Gas Company were defendants in an action brought against them by a Mr. Scanes, to recover damages for injuries caused to him by the negligence of one of their workmen. The Company had been called upon to fix a gas-stove on the second floor, and a gas bracket on the staircase, of plaintiff's premises in the Cathedral Yard, Exeter. One of the Company's men was sent to do the work; and the negligence charged against him was that he had made a connection with an old pipe, the end of which was uncapped. Gas issuing from this pipe was ignited by a match incautiously struck by one of the occupants of the premises while the plaintiff was endeavouring to close the end of the pipe to stop the escape. An explosion at once followed; the plaintiff being severely burned, and the premises damaged. Defendants denied the negligence, and said if there was any there was contributory negligence on the part of the plaintiff. In the result, the jury returned a verdict for plaintiff, with £220 damages and the costs in the action.

The Gaulard and Gibbs Patent for Secondary Generators.—In the House of Lords last Friday, the Lord Chancellor and Lords Herschell and Morris heard an appeal against an order of the Court of Appeal confirming an order of Mr. Justice Kekewich, by which the Gaulard and Gibbs patent No. 4362 of 1882 was revoked. The patent was for an alleged invention of a new system of distributing electricity for the production of light and power by secondary generators; the invention being described as consisting in "the employment of an alternating current produced by an electro-dynamo machine, and determining by its passage through an unlimited number of induction coils of special construction the creation of induced currents, whose quality and value depend solely upon the construction of the induction coils." In 1886 Mr. Ferranti presented a petition for the revocation of the patent. The appellants thereupon applied to amend their specification by disclaimer; and the specification was accordingly amended. The Court of Appeal held that the effect of the amendment was to alter the nature of the invention for which the patent had been originally granted, and therefore revoked the patent. Their Lordships now affirmed the decision of the Court below, and dismissed the appeal with costs.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 242.)

Issue.	Share	When ex-Dividend.	Dividend Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Apr.	10½	Alliance & Dublin 10 p. c.	10	17—18	..	5 16 8
100,000	10	,,	7½	Do. 7 p. c.	10	12½—13½	..	5 11 1
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	107—109	..	4 11 9
100,000	20	30 May	8	Bahia, Limited	20	19—21	..	7 12 4
200,000	5	15 May	7½	Bombay, Limited	5	7—7½	..	5 0 0
40,000	5	,,	7½	Do. New	4	5—5½	..	5 9 1
380,000	Stck.	27 Feb.	12½	Brentford Consolidated	100	218—223	..	5 9 10
125,000	,,	,,	9½	Do. New	100	160—165	..	5 12 2
220,000	20	13 Mar.	11	Brighton & Hove Original	20	40—42	..	5 4 9
320,000	20	28 Mar.	11½	British	20	43—45	..	5 0 0
50,000	10	13 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—14	..	5 14 3
328,750	10	13 June	8	Buenos Ayres (New) Limited	10	13—14	..	5 14 3
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	103—106	..	5 13 2
150,000	20	27 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Apr.	13⅜	Commercial, Old Stock	100	252—257	..	5 7 0
130,000	,,	,,	10½	Do. New do.	100	203—208	..	5 3 4
130,000	,,	27 June	4½	Do. 4½ p. c. Deb. do.	100	117—122	..	3 13 9
557,320	20	13 June	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	,,	13	Do. New '69 & '72	14	33—35	..	5 4 0
200,000	20	,,	10	Do. 7 p. c. Pref.	20	38—40	..	5 0 0
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	195—205	..	4 17 7
234,060	10	16 July	13	European, Limited	10	28—30	..	4 6 8
120,000	10	,,	13	Do. New	7½	19—20*	..	4 17 9
354,060	10	,,	13	Do. do.	5	13—14*	..	4 12 10
5,470,620	Stck.	13 Feb.	13†	Gaslight & Coke, A, Ordinary	100	243—248	—1	5 4 9
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—103	..	3 17 8
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	253—258	..	3 17 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	121—125	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	180—185	..	4 1 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	164—169	—½	4 2 9
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	253—258	..	3 17 6
1,061,150	,,	13 June	4	Do. 4 p. c. Deb. Stk.	100	115—120	..	3 6 8
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	123—128	..	3 10 4
650,000	,,	,,	6	Do. 6 p. c. do.	100	163—168	..	3 11 5
3,800,000	Stck.	15 May	12	Imperial Continental	100	216—220	..	5 9 1
75,000	5	13 June	6	Malta & Mediterranean, Ltd.	5	5—5⅛	..	5 9 1
500,000	100	1 Apr.	5	Met. of Melbourne, 5 p. c. Deb.	100	112—114	..	4 7 9
541,920	20	13 June	6½	Monte Video, Limited	20	19⅝—20⅜	—⅛	6 6 10
158,000	5	30 May	10	Oriental, Limited	5	8⅞—9	..	5 11 1
60,000	5	28 Mar.	7	Ottoman, Limited	5	5⅛—6	..	5 16 8
166,870	10	16 July	4	Para Limited	10	4—5*	..	8 0 0
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	98—102	..	5 17 8
500,000	100	2 Dec.	6	2nd Do.	100	95—100	..	6 0 0
150,000	10	16 Apr.	10	San Paulo, Limited	10	14—15	..	6 13 4
500,000	Stck.	27 Feb.	13½	South Metropolitan, A Stock	100	290—295	—2½	4 9 10
1,350,000	,,	,,	11½	Do. B do.	100	235—240	..	4 15 10
141,500	,,	,,	12	Do. C do.	100	247—252	..	4 15 3
650,000	,,	27 June	5	Do. 5 p. c. Deb. Stk.	100	140—145	..	3 9 0
60,000	5	27 Feb.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
						*Ex.div.		
				WATER COMPANIES.				
728,446	Stck.	13 June	9½	Chelsea, Ordinary	100	265—270	..	3 10 4
1,720,560	Stck.	16 Apr.	7½	East London, Ordinary	100	213—218	..	3 8 10
544,440	,,	27 June	4½	Do. 4½ p. c. Deb. Stk.	100	142—147	..	3 1 2
700,000	50	13 June	9	Grand Junction	50	122—126	..	3 11 5
708,000	Stck.	13 Feb.	10½	Kent	100	275—285	..	3 13 8
1,043,800	100	27 June	9½	Lambeth, 10 p. c. max.	100	250—255	..	3 14 6
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	122—126	..	3 3 6
500,000	100	13 Feb.	12½	New River, New Shares	100	367—372	..	3 5 2
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk	100	127—130	..	3 1 6
902,300	Stck.	13 June	6	S'thwk & V'xhall, 10 p. c. max.	100	170—174	..	3 9 0
126,500	100	,,	6	Do. 7½ p. c. do.	100	158—163	..	3 13 7
1,155,066	Stck	13 June	10	West Middlesex	100	265—270	..	3 14 1

† Next dividend will be at this rate.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON." TELEPHONE No. 2698.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

ESSEX STREET WORKS, VICTORIA EMBANKMENT LONDON, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co. for Gas Exhausters, &c.

They have completed Exhausters to the extent of 29,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

Catalogues and Testimonials on application.

Exhausting Machinery at Fulham and Bromley Gas-Works—each set passing 400,000 cub. ft. per hour, drawing 14 miles distant from Beckton.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c. Tools and Sundries.

TAR and Liquor wanted.
BROTHERTON AND CO., Commercial Buildings, LEEDS.

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February, 1890: Coal consumed, 8600 tons. Gas made, 92,880,000 feet; ditto sold, 84 880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

SITUATION wanted, as Secretary to a Company. Age 38. Twenty-two years' experience; seven years as Secretary. Thorough knowledge of duties, good Accountant, Shorthand. Highest references.
Address S. N., Messrs. DAWSON'S, 121, CANNON STREET, E.C.

WANTED, a second Fitter. One accus-tomed to Gas-Works preferred. Wages 24s. per week. Constant employment. Also a YOUTH as Apprentice.
Apply to the MANAGER, Gas-Works, FALMOUTH.

WANTED, a Man (without children preferred) to make Gas at a small Gas-Works, and do other light Work. Wages 15s. per week, with Cottage and small Garden, Coal, and Light.
Apply, by letter, to No. 1844, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a practical Working MANAGER for small Gas-Works. Preference given to an Industrious Man prepared to invest Capital, and take share of Profits.
Apply, by letter, to No. 1843, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LLANBERIS GAS-WORKS.

TO BE SOLD cheap, by Private Treaty, the above Works, erected in 1871 at a cost of £2500, which are compact and in good working order. Freehold.
Apply to ROBERT ALGEO, ESQ., MENAI BRIDGE.

THE Hornsey Gas Company have for SALE Two Cast-Iron TOWER SCRUBBERS—one 7 ft. 6 in. diameter by 30 feet high, and the other 10 feet diameter by 40 feet high—in good condition.
Full particulars can be obtained at the GAS-WORKS, Clarendon Road, HORNSEY, N.

FOR SALE—One 8 horse power Engine and COAL BREAKER, with top and bottom Elevator, Gear, and Patent Wrought-Iron Chain, with Malleable Iron Buckets complete.
The above Machinery is almost new, having only been in use about Three months.
For further particulars, apply to the COAL DISTILLATION COMPANY—COOPER'S PATENTS—LIMITED, 322 and 323, Winchester House, Old Broad Street, LONDON E.C.

FOR SALE—Four excellent Wrought- IRON TANKS, 300 to 10,000 gallons. One circular PAN, 6 ft. by 3 ft. Several good OIL and TAR PUMPS. A lot of Cast-Iron 2-inch SOCKET PIPES and BENDS. Three Cast-Iron ROSIN STILL WORMS and STAYS complete; and other useful Fittings. Must be cleared for alterations.
Apply to Mr. F. MORRIS, Tar and Rosin Distiller, Plough Bridge, Rotherhithe, LONDON, S.E.

LEEDS CORPORATION.
(GAS DEPARTMENT.)

FOR SALE—Two of Korting Bros. STEAM-JET EXHAUSTERS, in good working condition, each capable of passing 120,000 cubic feet per hour. The Exhausters can be seen, and further particulars obtained, on application to Mr. Smith, Manager, Gas-Works, New Wortley.
Tenders of price offered to be addressed to the Chairman of the Gas Committee, Municipal Offices, Leeds, on or before Saturday, the 16th of August next.

FARNWORTH, NEAR BOLTON.

TO be Sold or Let on Lease (the whole, or such parts as may be agreed upon), the SITE of the late CHEMICAL WORKS at Prestolee, with Buildings thereon, and the use of Chimneys. Suitable for carrying on the business of Vitriol, Soda Ash, Bleaching Powder, Soap, and other manufactures. Coal and Water adjoining the Land, and convenient for carriage. A Canal, with a branch wharf, runs alongside the property.
Apply to JOSEPH LEACH, Estate Agent, FARNWORTH.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 184 of last week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

TOTTENHAM AND EDMONTON GAS COMPANY

£895 STOCK IN THIS FLOURISHING UNDERTAKING, OFFERING INVESTMENTS OF THE SOUNDEST CHARACTER.

MR. ALFRED RICHARDS will Sell by Auction at the Angel Hotel, Edmonton (close to Silver Street Station, Great Eastern Railway), on Wednesday evening, July 30, 1890, at Seven o'clock punctually, in convenient lots, £560 ORIGINAL "A" STOCK and £335 "B" STOCK in the above Company, paying Dividends of 11½ and 8 per cent. respectively.
Particulars of the AUCTIONEER, TOTTENHAM, and 8, NEW BROAD STREET, E.C.

BY ORDER OF THE DIRECTORS.

ENFIELD GAS COMPANY.
1200 £10 SHARES.

MR. ALFRED RICHARDS is favoured with instructions to SELL BY AUCTION at the Mart, Tokenhouse Yard, E.C., on Wednesday, July 30, 1890, at Twelve for One o'clock precisely, in lots of ten shares each, 1200 £10 SHARES in the Enfield Gas Company, ranking for a maximum Dividend of 7 per cent. (the last Dividend paid on the same class of Shares was at the rate of 6 per cent.); and they offer investments of a sound and improving character.
Particulars may be obtained of Mr. PURDEY, Secretary to the Company, ENFIELD TOWN; of Messrs. F. J. and G. J. BRAIKENRIDGE, Solicitors, 16, BARTLETT'S BUILDINGS, E.C.; and of the AUCTIONEER, TOTTENHAM, and 8, NEW BROAD STREET, E.C.

TENDERS FOR COAL.

THE Eccleshill and Bolton Gas Com-pany invite TENDERS for 2000 tons of GAS COAL, to be delivered at the Railway Station (G.N.R.) in Twelve months, in such quantities, from time to time, as may be required.
Tenders, endorsed, must reach me not later than Thursday, the 7th of August.
J. MELLOR, Secretary.
Eccleshill, near Bradford,
July 25, 1890.

TAR AND LIQUOR.

THE Eccleshill and Bolton Gas Com-pany invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR, to be produced at their Works, together or separately, for Twelve months, from the 1st of September next.
Can be delivered in Contractor's Tanks at the Station (G.N.R.).
Coal carbonized, per annum, about 1800 tons.
Tenders, sealed and endorsed, must reach me not later than Thursday, the 7th of August.
J. MELLOR, Secretary.
Eccleshill, near Bradford,
July 25, 1890.

GAS EXHAUSTER AND ENGINE WANTED.

THE Gas Committee of the Newry Town Commissioners invite TENDERS for the supply and erection of a new GAS EXHAUSTER, capacity 20,000 cubic feet per hour, and an eight-horse power STEAM-ENGINE, with the necessary Couplings and Connections for working the Gas Exhauster.
The Gas Committee will provide and build the requisite foundations.
Further particulars can be obtained from Mr. A. Gibb, Manager; and sealed tenders, addressed to the Chairman, Gas-Works, Newry, to be delivered up to Thursday evening, the 7th of August next.
J. KERNAGHAN, Secretary.
Gas-Works, Newry, July 26, 1890.

TENDERS FOR GAS COAL.

THE Directors of the Clayton, Allerton, and Thornton Gas Company invite TENDERS for the supply of about 5000 tons of Screened GAS COAL, COBBLES, or NUTS, and 800 tons of CANNEL COAL. The Coal to be free from Scale, Sulphurous Pyrites, or other objectionable matter, and to be delivered at the Gas-Works, Low Lane, Clayton, or at the Great Northern Railway Station, Clayton, in such quantities weekly as may be ordered by the Company's Manager.
The said tenders to state the Seam and Pit from which the Coal is intended to be sent.
Sealed tenders, endorsed "Tender for Gas Coal," and addressed to the Chairman at the Gas-Works, to be delivered at or before Noon on Monday, the 11th day of August, 1890.
The Directors do not pledge themselves to accept the lowest or any tender, reserving to themselves the right to divide the contract as they may think proper.
By order, JOHN NIVEN,
Secretary and Manager.
Gas-Works, Clayton, near Bradford,
July 8, 1890.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 270.
Inquiries should be addressed to THE COZE SYNDICATE, LIMITED, 86-88A, LEADENHALL STREET, E.C.

BENTLEY & CO.

MANCHESTER ELECTRICAL STORES.

FOR Batteries, Bells, Wires, and Special Electrical Apparatus, address the best house
17, NEWTON STREET, PICCADILLY, MANCHESTER.

TENDERS FOR COAL.

THE Committee of the Chipping Nor-ton Gas Company invite TENDERS for the supply of 700 tons of really good GAS COAL.
Tenders to specify the description of coal, also the Pits at which it is to be raised, and to be addressed to H. C. WILKINS, Secretary.
Offices, High Street,
Chipping Norton.

LEIGH LOCAL BOARD.

THE Gas Committee of the Leigh Local Board invite TENDERS for the supply and delivery of about 200 tons of Cast-Iron MAIN PIPES and CONNECTIONS, from 18 inches to 3 inches diameter.
All particulars, with form of tender, may be had from the undersigned.
Sealed tenders, endorsed "Mains," and addressed to Mr. Alderman Thorp, Chairman, to be delivered at the Town Hall, Leigh, on or before Monday, the 18th of August next.
The lowest or any tender not necessarily accepted.
ALFRED T. FLETCHER,
Engineer and Manager.
Gas-Works, Leigh, Lancashire,
July 26, 1890.

LEIGH LOCAL BOARD.

THE Gas Committee of the Leigh Local Board invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of One year from the 1st of September next.
All particulars, with form of tender, may be had from the undersigned.
Sealed tenders, endorsed "Tar," and addressed to Mr. Alderman Thorp, Chairman, to be delivered at the Town Hall, Leigh, on or before Monday, the 18th of August next.
The highest or any tender not necessarily accepted.
ALFRED T. FLETCHER,
Engineer and Manager.
Gas-Works, Leigh, Lancashire,
July 26, 1890.

TO COAL CONTRACTORS AND OTHERS.

THE Sedgley Local Board invite TENDERS for supplying 500 to 1000 tons of GAS COAL. The deliveries to be made at the Short-End Siding, at such times and in such quantities as may be directed.
Sealed tenders, marked "Coal," to reach me on or before the 6th of August next.
The Board do not bind themselves to accept the lowest or any tender.
By order,
JOSEPH SMITH,
Clerk to the Board.
High Holborn, Sedgley,
July 21, 1890.

TO COAL MERCHANTS.

THE Milton Improvement Commis-sioners invite TENDERS for the supply and delivery at Milton of 700 tons of GAS COALS; the Contract to date from the 31st of August, 1890.
A form of tender (none other will be received) can be obtained on application to Mr. T. Pike, Manager of the Gas-Works.
Sealed Tenders, endorsed "Tender for Gas Coals," and addressed to the Chairman of the Milton Improvement Commissioners, to be sent or delivered to me not later than Monday, Aug. 18, 1890.
The Board do not bind themselves to accept the lowest or any Tender.
By order,
WM. PARHAM, Clerk.
Milton-next-Sittingbourne,
July 24, 1890.

COUNTY BOROUGH OF STOCKPORT.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to re-ceive TENDERS for a supply of 1000 Tons of good screened GAS COAL NUTS, delivered at their Works, for the year ending June 30, 1891.
The Committee do not bind themselves to accept the lowest or any tender.
Further particulars may be obtained on application at the Millgate Works.
Tenders to be delivered on or before Thursday, Aug. 7 next, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Coal Nuts."
JAMES JACQUES,
Engineer and Manager.
Millgate Works, Stockport,
July 28, 1890.

HOLMSIDE GAS COALS.

THE Owners of Holmside and South Moor Collieries possess an undivided area of nearly 5000 acres of COAL in the County of Durham, over the greater portion of which area the most of the best Coal of the district, including the well-known Hutton Seam, remains almost untouched; and as preparations are being made for working the Hutton Seam on a large scale, it is expected that the reputation of HOLMSIDE GAS COALS will be still further increased. The Holmside and South Moor Collieries have been in the hands of the same families for over half a century; but, until lately, no adequate attempt has been made to open out their very large Coal-Field, notwithstanding that the best Coal of the district around them, and especially the Hutton Seam, has been for some time past seriously diminished by reason of the vigorous workings of neighbouring coal-owners. Holmside Gas Coals are now being worked out of Holmside and South Moor Collieries at a rate of about 2200 tons per working day—a rate totally inadequate to meet the existing demand. By an extensive development of workings in the Hutton Seam, it is hoped that the demand may be fully met, and the quality raised to the highest point attainable by Durham Coal.

For price and particulars, apply to MARK ARCHER, Holmside and South Moor Offices, Quayside, NEWCASTLE-ON-TYNE.

LOWESTOFT WATER, GAS, AND MARKET COMPANY.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Lowestoft Water, Gas, and Market Company are prepared to receive TENDERS for the purchase of the surplus TAR and the whole of the AMMONIACAL LIQUOR produced at the Works for One year, from the 1st of August next.

The Tar and Liquor will be pumped into Tanks or Casks, to be provided by the Contractor, and delivered on the Works of the Company.

Tenders, stating price per 1000 Gallons for every degree of strength from 5° to 9° Twaddel for the Liquor, and price per Gallon for the Tar, to be addressed to the Manager, in envelopes, endorsed "Tender for Tar and Ammoniacal Liquor," to be delivered not later than the 6th day of August, 1890.

The Directors do not bind themselves to accept any tender.

JOHN AYRIS, Manager.

Lowestoft, July 28, 1890.

CORPORATION OF BURNLEY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for the supply of the CANNEL COAL and CANNEL NUTS required by them during the Twelve months ending the 31st of July, 1891.

Approximate quantity, 3000 tons.

The Cannel must be delivered into the wagons of the Corporation at their Wharf on the Leeds and Liverpool Canal adjoining the Gas-Works.

Any person or persons tendering may be required to send samples of the Cannel offered, at the quoted prices before the Contract is let.

Tenders, sealed, specifying the description of the Cannel, and the pits at which it is raised, must be addressed to the Chairman of the Gas Committee, Town Clerk's Office, endorsed "Tender for Cannel," and posted not later than Wednesday, the 30th of July, 1890.

ROBERT E. FOX, Town Clerk.

SUPPLY OF COAL.

THE Westbury Gas Company (Wilts.) invite QUOTATIONS for the supply of 600 to 700 tons of clean, good quality, screened GAS COAL delivered at Westbury Station in quantities as required before and up to the 30th of June next.

Offers to be addressed to Mr. N. H. HUMPHRYS, Gas Engineer, SALISBURY.

CANTERBURY GAS AND WATER COMPANY.

GAS COALS.

THE Directors invite Tenders for the supply of 10,000 tons of best NEWCASTLE GAS COALS to be delivered during One year from the 1st of August next.

A form of tender, with particulars and conditions of the contract, may be obtained at the Company's Offices.

Tenders, sealed up, and endorsed "Tender for Gas Coals," to be delivered to me not later than Tuesday, the 5th of August next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
JAMES BURCH, Secretary.

Castle Street, Canterbury,
July 24, 1890.

TO TAR DISTILLERS AND OTHERS.

THE Dover Gaslight Company invite TENDERS for the purchase of the surplus TAR produced at their Works for a period of Twelve months from the 1st of October next.

Probable quantity, about 100,000 gallons.

The tenders to state price per ton of 200 gallons, delivered into Trucks at a Railway Station in Dover, or into Barges f.o.b. Dover Harbour.

The Purchaser to find casks, and remove as required by the Company.

Terms of payment monthly.

The highest tender not necessarily accepted.

Tenders to be sent on or before Saturday, the 9th day of August, marked "Tender for Tar," to
G. FIELDING, Secretary.

Gaslight Company, Dover,
July 18, 1890.

BOROUGH OF DEWSBURY.

THE Gas and Water Committee of the above Corporation invite TENDERS for the supply and delivery, during the Twelve months ending the 31st day of August, 1891, of

1. Sulphuric Acid.
2. Wet and Dry Gas-Meters.
3. Cast-Iron Gas and Water Pipes.

Specifications and forms of tender may be obtained on application to the Gas Engineer, Mr. Chas. A. Craven, Gas-Works, Savile Town, Dewsbury.

Tenders, under sealed cover, endorsed "Sulphuric Acid," "Meters" or "Cast-Iron Pipes," (as the case may be), to be sent to me not later than Saturday, the 9th day of August next.

The lowest or any tender will not necessarily be accepted.

By order,
E. MAWDESLEY, Town Clerk.

Town Clerk's Office, Dewsbury,
July 23, 1890.

THE GASLIGHT AND COKE COMPANY.

NOTICE is hereby given, that a Half-YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at this Office, on Friday, the 8th day of August next, at Twelve o'clock (noon) precisely, to transact the usual business, including the Declaration of a Dividend for the Half Year ending on the 30th day of June last.

NOTICE IS HEREBY ALSO GIVEN, that at such Meeting the Directors will apply to the Proprietors for authority, in pursuance of Section 19 of the Scheme for the Amalgamation of The London Gaslight Company with this Company, which was confirmed by order of Her Majesty in Council, on the 22nd day of May, 1883, to create and issue the sum of £476,000 of Six per Cent. Preference Stock—viz., £150,000 under the powers of The London Gaslight Act, 1852; £26,000 under the powers of The London Gaslight Act, 1857; and £300,000 under the powers of The London Gaslight Act, 1866.

By order,
JOHN ORWELL PHILLIPS,
Secretary and General Manager.

Chief Office, Horseferry Road, Westminster, S.W.
July 23, 1890.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Bridge House Hotel, London Bridge, in the Borough of Southwark, on Wednesday, the 20th day of August next, at Two o'clock in the Afternoon precisely, to receive the Directors' Report, and the Accounts of the Company for the Half Year ended the 30th of June last, and to declare a Dividend for the same period.

The Transfer Books will be closed from the 6th day of August until after the Meeting.

By order,
FRANK BUSH, Secretary.

Offices: 709A, Old Kent Road, S.E.,
July 26, 1890.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

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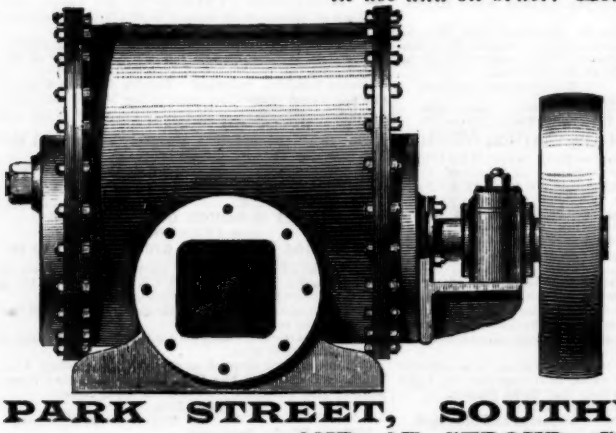
PATENT FOUR AND THREE BLADE GAS EXHAUSTERS.

With or without Engine combined. To pass up to 300,000 cubic feet per hour. Nearly 200 in use and on order. Model sent for inspection.



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Contractors for Building Shafts, Tanks, Retort Benches, and all other Buildings connected with Gas-Works.
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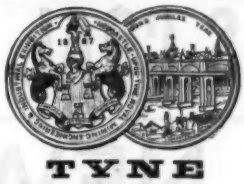

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Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
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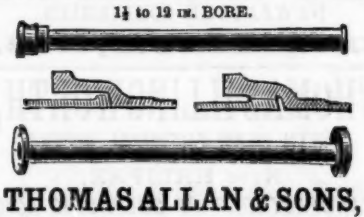

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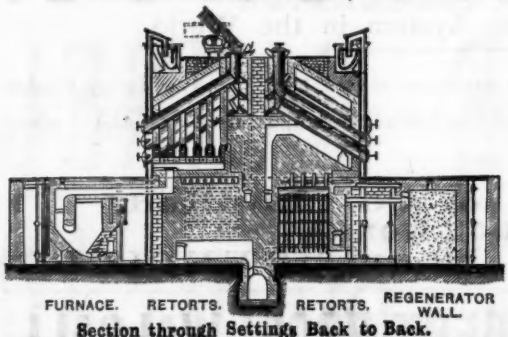
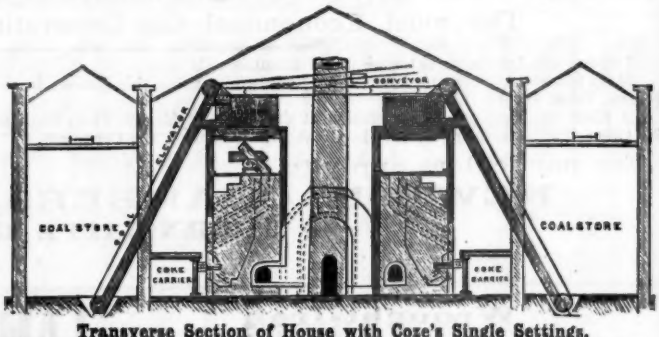
This System of Automatically Charging and Discharging Retorts without machinery or arduous labour is in operation at several places on the Continent and in America, and will shortly be at work in various Gas-Works in England.

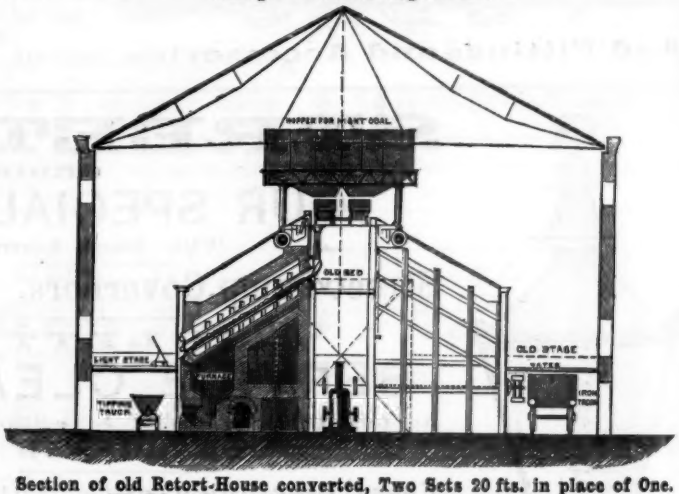


Section through Settings Back to Back.
Working off ground floor with Generator under Stage and Regenerator under the Sets.

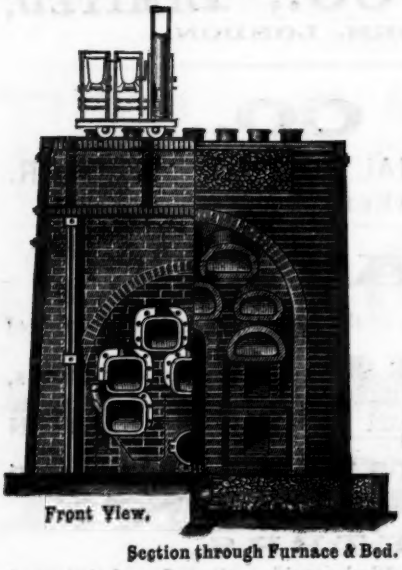


Transverse Section of House with Coze's Single Settings,
Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic.
This plan is for a large House.

Section through Middle Retort and Furnace.

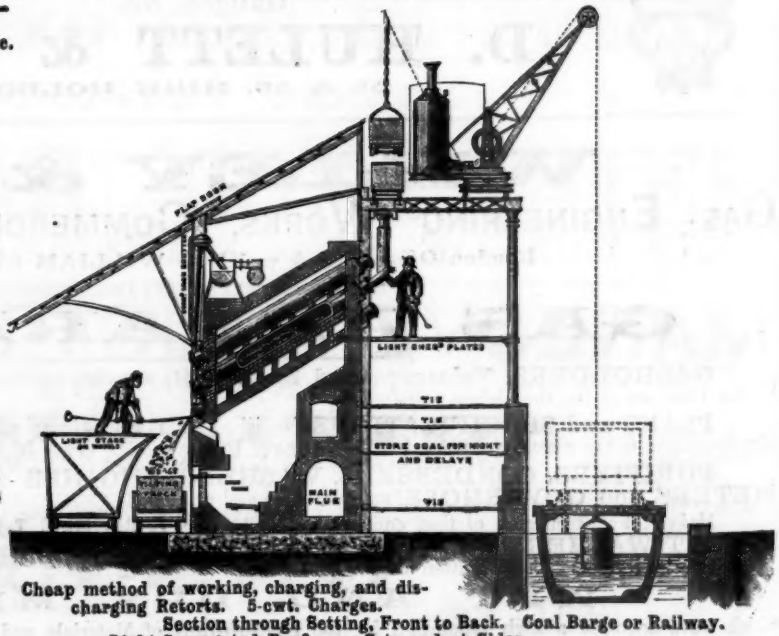


Section of old Retort-House converted, Two Sets 20 fts. in place of One.
Modified form, with ordinary Retorts and Fittings.



Front View.

Section through Furnace & Bed.



Cheap method of working, charging, and discharging Retorts. 5-cwt. Charges.
Section through Setting, Front to Back. Coal Barge or Railway.
Light Corrugated Roof over Sets and at Sides.

These Systems are fully Patented, and any Infringer will be strictly proceeded against.

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Thousands in constant work, give universal satisfaction.

Work Easier, Less Friction, Last Longer, and do Better Work than straight Grooves.

Main Drilling Stand, with Cup Drills, 1¼ to 6 inch; Taps, Rymers, and Drills.

Ratchet Screwing Stocks, and Adjustable Once-up Stocks, Dies, Guides &c.

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The simplest and most economical Gas-Engine made.

THE BEST ENGINE FOR ELECTRIC LIGHT.

Consumes less Gas per brake horse power than any other Gas-Engine.

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IS WITHOUT SMELL.

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HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

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Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. AMSTERDAM: 264, N. Z. Voorburgwal. BERLIN, BARCELONA, and ANTWERP.
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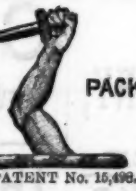

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SQUARE. Every 10 feet has Label as above, and bears our Trade Mark.

Under this registered title are included the inventions of Mr. Field; and experience has proved them to be the MOST EFFICIENT DURABLE, and ECONOMICAL PACKINGS ever made. They constitute such a combination of Asbestos and India-rubber as secures the maximum of elasticity and heat resistance; and they are, therefore, UNEQUALLED FOR EVERY KIND OF ENGINE. These Packings are being universally used by most of the leading Steamship Companies throughout the world for ordinary Compound, Triple, and Quadruple Expansion Engines of the latest types. The packings are composed of rolled Asbestos Cloth, but the India-rubber is placed in two forms to suit various cases

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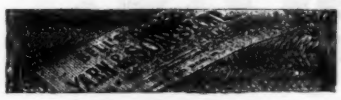

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BELL'S ASBESTOS LUBRICANT
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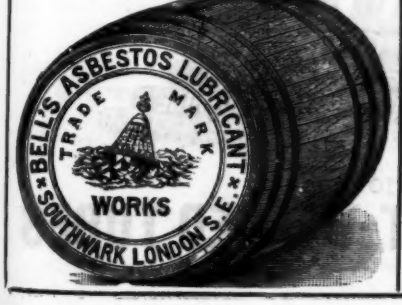
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



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ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL.

Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

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Is the most efficient and reliable Material for Manhole, Mudhole, Steam-Pipe, and all other Joints.

BELL'S ASBESTOS
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Can be applied again after many years' service. Is sent out dry in bags: therefore cheaper than others sent out wet.

Will reduce loss by radiation and saves 40 per cent. of fuel. Is superior to any other, and saves its cost in a few months.

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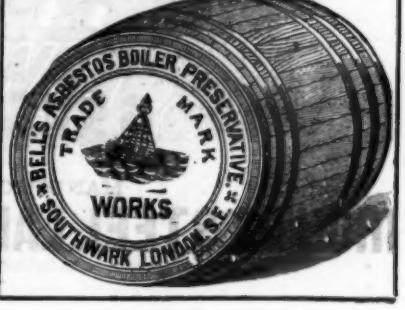
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



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(REGENERATOR).

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Gas Lighting and Ventilating Engineers,
PRINCESS STREET, MANCHESTER.

WILLIAM INGHAM & SONS,
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Near LEEDS

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—
1. Smooth interior, preventing Adhesion of Carbon.
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NEW HIGH-POWER GAS-LAMP.
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Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

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SOCKET-PIPES FOR GAS OR WATER PURPOSES.
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MAKE
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IN IRON OR STEEL
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A SPECIAL COMPOUND
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A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.
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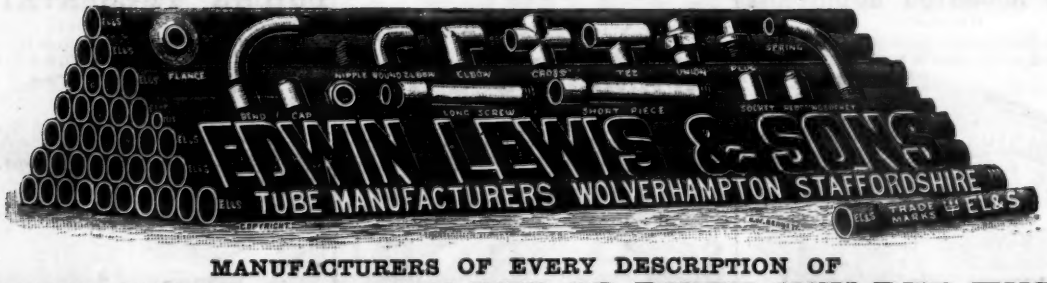

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(Kelman's English & American Patents).

These Apparatus are in use at the Gas-Works at Lincoln, Mountain Ash, Neath, Ellesmere (Salop), Woodstock (Cape Town); and
Two large CONDENSERS, capable of dealing with **4,000,000** cubic feet of Gas per day have recently been erected at the Gas-Works at Sheffield. A large CONDENSER is also being erected at the Montreal Gas-Works.

PERFECT CONDENSATION. NO POWER REQUIRED.

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GAS and WATER ENGINEERS,

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GLASS—Flint Opal, and Bent in Stock, and Cut to Sizes.

WELL LAMPS, STREET NAME TABLETS,

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Improved High-Power Lanterns for Lighting Street Refuges and Open Spaces.

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For Streets, Railway Platforms, &c., &c.

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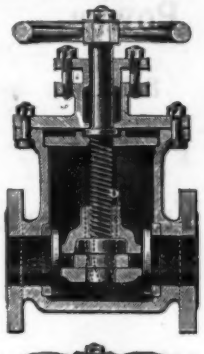

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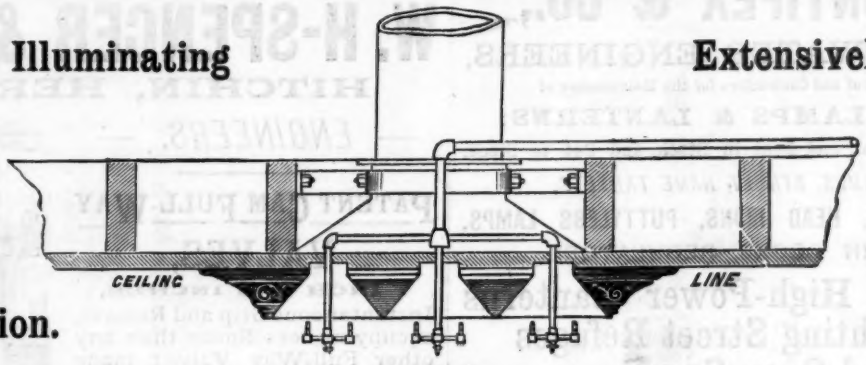

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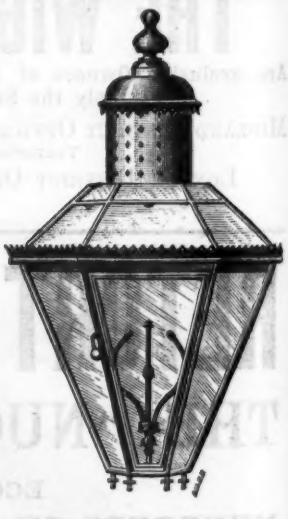

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[See also Advt., p. 238

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